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ABSTRACT

This volume attempts to bring together important contributions about the economics of higher education for the use of educators and others concerned with the formulation of educational policy. Part I of the volume concerns the demands of students for higher education and of the Nation for high-talent manpower. Part II presents the fundamentals of a theory of investment in people through education. It includes consideration of essential differences and similarities between investment in people and investment in physical capital, an assessment of the educational stock of the labor force, both in terms of original cost and in terms of replacement, and estimates of the volume of resources allocated to education and the return of this investment. Part III deals with the financing of higher education and covers a wide range of sources of funds, public and private. Part IV describes briefly the ongoing research in the economics of higher education and outlines the range of issues that require still further study. (Author)

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Foreword

THE IDEA for this publication emerged from a meeting of a group of economists called by the Office of Education more than a year ago. The Office of Education is indebted to the eminent economists who gave so willingly of their time as a public service to make this publication possible. They have joined with the Office of Education in suggesting not only the range of economic problems on which initial research has been done and implications of that research for higher education but also the areas in which additional research is needed.

Our joint interest and concern throughout has been to stimulate additional research efforts, as well as to make some recent findings available to those concerned with policy and administration in higher education. Through continued research in the economics of higher education, the accomplishment of the task ahead of providing quality higher education for greatly enlarged numbers of young people will be facilitated. The importance of this task cannot be overestimated.

STERLING M. MCMURRIN,
Commissioner of Education.

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Editor's Note

IN THE PAST FEW YEARS an important beginning has been made toward defining and exploring the major issues in the economics of higher education. The research of economists covers a wide range of problems, from that of the Nation's requirements for college-trained people, to detailed questions of financing. Perhaps no single area of this work offers larger promise than that of research on education as an investment in people.

The work that has already been done on educational investment permits a reinterpretation of educational outlays, viewing these outlays, at least in part, as additions to our national wealth.

New questions are being raised about the relative amounts of physical capital formation and formation of human capital and their relative contributions to economic growth. Preliminary findings suggest that education has contributed importantly to economic growth in the past and that large returns can be expected in the years ahead.

At the suggestion originally of Dr. Herbert S. Conrad, Coordinator of Higher Education Research, the Division of Higher Education has sought through this volume to bring together important contributions about the economics of higher education for the use of educators and others concerned with the formulation of educational policy.

The caliber of the contributors and their work are evidence of the vitality and strength of higher education, for these busy people gave willingly of their time and professional skills to furnish important new materials for consideration in the development of educational policy. Their deep concern and interest in furthering higher education made the task of the editor, assisted by Lanora G. Lewis, a gratifying experience.

The enthusiasm of educators and administrators who read early drafts of the chapters heightened the expectation that the volume would serve as a bridge between the work of the economist and that of the educational community.

The Division sought, too, to provide through this publication a working tool for the economist turning anew to research on higher education. This volume is a summary of a substantial segment of earlier research and opens up new questions for inquiry on a broad range of macroeconomic problems. Part I of the volume concerns the demands of students for higher education and of the Nation for high talent manpower. Part II presents the fundamentals of a theory of investment in people through education. It includes consideration of the essential differences and similarities between investment in people and investment in physical capital, an assessment of the educational stock of the labor force—both in terms of original cost and in terms of replacement—and estimates of the volume of resources allocated to education and the return on this investment. Part III deals with the financing of higher education and covers a wide range of sources of funds, public and private. Part IV describes briefly the ongoing research in the economics of higher education and outlines the range of issues which require still further study.

Manuscripts for this volume were received in the spring of 1961. Considerable research has been completed since that date and new information has become available. These new research findings and data, for the most part, are not reflected in the volume. Of particular interest are the papers on investment in human capital to be included in the August 1962 Supplement to the *Journal of Political Economy* and John Vaizey's *The Economics of Education.*

The content of the essays and the views expressed are solely the responsibility of the authors. No attempt was made to gain uniformity of opinion. One of the assets of this collection of works is the stimulation it provides through the posing of yet unresolved issues. The Division hopes that this publication will encourage the further research which is required to gain a common understanding of the facts involved and to reconcile divergent points of view.

SELMA J. MUSHKIN,
Economic Consultant.

Introduction

Homer D. Babbidge, Jr.[*]

THE NATION is facing up to rapidly increasing demands for college and university education. In the academic year 1960-61 alone, college enrollments advanced 6 percent over those of the previous year, and the impact of the post-World War II population explosion is just beginning to be felt. Year after year for the next two decades we can expect that a growing number of qualified young people will seek opportunities for a college education. And this growth will be accelerated by the advancing aspirations of young people and the insatiable appetite of a complex society for college graduates.

In a democratic society there is really no choice but to accommodate the educational demands of the people. Individual colleges and universities may be able to resist those pressures, but in the aggregate they have no choice but to grow larger or more numerous, or both. Where there is a choice—and it is a vitally important one—it is in the quality of higher education. Quality will be maintained only if educational resources grow commensurately with enrollment increases.

There have been other periods in our national history when we have effected a large proportionate growth in enrollments in colleges and universities. Philip Lindsley, then president of the University of Nashville, observed in 1829 that "Colleges rise up like mushrooms in our luxuriant soil." "A settler could hardly encamp on the prairies," said a western observer of the period, "but a college would spring up beside his wagon." Between 1840 and 1860 the number of permanent—or surviving—colleges in the United States doubled. It is altogether probable that college enrollments doubled in the single decade immediately preceding the Civil War. Americans—and their churches in particular—wanted college facilities in quantity, and they got them.

But quality suffered. Lindsley described the "mushrooms" of his period as "promising to work cheap; and to finish off and graduate, in double-quick time, and in the most approved style, all who may come to them." Subsequent students of the period incline to support his contention that, though they "all claim to be equal at least to old Harvard and Yale," they were not deserving of the name college.

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[*] Former Assistant Commissioner for Higher Education, Office of Education.

The problem that confronts us now is, of course, vastly different in many respects. We face not a sudden, short term growth, but a vast and continuing increase in enrollments. Shall we pay for this quantitative growth, as we have in the past, through a lowering of quality? And if we should manage to *maintain* quality in the face of numbers, shall we be able to effect a positive improvement in quality—the need for which no reasoning man can question? And will our institutions, on top of all this, be able to add the programs, do the research, provide the ideas needed to cope with the inevitable demands of a changing and growing society?

Just as the challenge ahead is unprecedented, so in all probability must be the approaches to meet it. Conventional methods are not likely to suffice, and temporary, ad hoc adjustments will not. There is a real need for refreshing reexamination of our methods for providing quality higher education in quantity. To gain these new perspectives, educators are drawing not only on their own professional capabilities but also on the skills of other disciplines, of which economics is one.

Economists have only recently turned their attention to higher education, but the issues they are raising offer a promise of new insights into the financing of higher education. While educational policy must necessarily be determined in the light of larger educational and social considerations, and not by costs and economic benefits alone, it is amply evident that the application of economic techniques holds promise of educational benefits.

Economists, as I read the writings represented in this volume, are emphasizing higher education as a means of developing human resources. They are attempting to assess the amount of investment made to achieve such development, and the yield to the individual, to industry, and to society. This emphasis, while in no way denying other aims of education, throws new light on the significance of the vastly enlarged outlays which will be required to provide high quality education for the mounting census of young people in the decades ahead. The problem is thus put in a new light; instead of "spending" resources we are devoting resources to an investment, which in fact contributes to the replenishment and enlargement of our national resource base.

The economist, in turning his special tools of analysis to the field of education, has inquired first—by the tests customary to him: How much should be spent on higher education? The first question necessarily raises a number of others and on the solution of these depends the answer to the larger question of what education's economic function really is. Education at one and the same time is a number of things, and there is no reason to believe that the economist is not aware of the social benefits that accrue from the educational process, or of the fact that education is an imperative foundation of our democratic processes, as well as a source of enjoyment, of satisfaction, and of enrichment. But he is principally concerned with its economic function. In the words of the economist, education is a consumer good as well as an investment. As a means of acquiring skills and abilities, it is an investment for the individual, which yields him a material return. But it is also a means of developing human resources so that a whole society can benefit from the contributions made to a space exploration, to cancer research, to the solution of metropolitan transportation problems, or to new methods of teaching and learning.

Starting from that single dimension of education as training for a pursuit (and fully aware of the limitations imposed by the singling out of a single product), the economists, as I read their essays, ask a series of additonal questions. What has been the contribution in the past of investment in education to economic growth? What is its potential contribution in the future? The work of Prof. Theodore Schultz, and the major contributions of others he has encouraged, are addressed in part to these questions.

Acceptance of higher education as an investment cannot but lead to a reexamination of the problems involved in financing our colleges and universities. Economists are providing a framework of reasoning about education, which helps to explain on going financial practices. Higher education traditionally has been financed in a diversified way by many types of contributors. State and local communities, churches, wealthy individuals, alumni, business, industry, and students and their families have all contributed to the financial support of higher education. These contributors acknowledge by their financial support the benefits that they derive from a strong system of colleges and universities. Communities that get better citizens, churches that get clergy, businesses that get better employees—all share in the costs of the productive machinery, along with the student who, whether he pays a tuition fee or not, makes a major outlay for college in terms of forgone earnings (see Marion B. Folsom, ch. 12 of this publication).

Economic analysis suggests possible new financial practices as well, including, for example, new financial institutions to facilitate student borrowing for higher education. Consideration of the differences in risks or burden involved in such borrowing, by students from low income families and by those from high income families, leads in turn to consideration of the need for scholarship programs as supplements to other student aids (see Richard S. Eckaus, ch. 8, and William Vickrey, ch. 16, of this publication).

The theme of investment that runs through the writing of the several contributors to this volume thus provides a framework for understanding better the patchwork quilt system of financing higher education that we have had in the past, and it suggests new instruments for and methods of dealing with these problems. The proposal for a reexamination of the tax treatment of educational expenditures (viewing these expenditures as a capital outlay, which might be amortized or written off over a period of years, much as we now provide for the writing off of the costs of physical capital outlays) illustrates another possibility that follows from economic analysis (see Richard Goode, ch. 17 of this publication).

The volume as a whole makes clear that the economist's method of analysis, when applied to the problems of higher education, can provide those responsible for educational policy with additional yardsticks and guidelines for action. The analytical work of economists thus can yield a new set of facts to be considered by those responsible for programing higher education—facts to be weighed along with noneconomic considerations in meeting the complex issues that press upon us.

In a very real sense, the intellectual strength of this Nation may well depend, among other factors, on a better understanding and application of the economics of higher education. It is to be hoped therefore that the authors of this volume will continue their interest in higher education and, by their example, stimulate others.

Part I

COLLEGE-TRAINED PERSONNEL: SUPPLY AND DEMAND

1/2

CHAPTER 1

College and University Enrollment: Projections

Louis H. Conger, Jr.[*]

PROJECTIONS of college and university enrollment provide essential information for National, State, and institutional long-range planning. Planning for facilities, staffing, and financing depends in substantial measure on the potential numbers of applicants for college and university places. Legislatures, administrative agencies, and many other private and public groups need projections of the demand for college education as a guide to steps that must be taken ahead of time if able young people are to have an opportunity for an education.

Projections of the demand for college and university places cannot be made precise, but they can still provide an adequate tool for planning purposes. What is needed is a reasonable estimate or range of estimates as a framework for policy decisions.

The demand for college education—the number of potential applicants for college places—is the controlling factor in future enrollments. There is reason to assume that the availability of college places will be accommodated to the demand. The forces that compel and facilitate accommodation of supply to numbers of applicants are many and powerful. Our history from colonial times to the present evidences our nationwide concern with educational opportunities and with broadening these opportunities. Recent events have served to strengthen this concern.

Our national interest clearly lies in a highly educated populace. In this complex world we can maintain leadership only through quality of the people, not through sheer numbers. Our democratic society emphasizes higher education as a ladder for social mobility and increased opportunity. For the individual higher education provides economic benefits, social status, and personal development. Both individual and national interest combine with a long historical tradition to form a commitment to education that will not be diverted without a major restructuring of the place of higher education in our society.

The projections of demand for places presented here indicate, however, that the task ahead of providing educational facilities, teaching staffs, and the financial base for adequate plant and staffing is formidable. If we fail in this task, actual enrollments will fall short of the figures projected.

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[*] Chief of the Reference, Estimates, and Projections Section, Educational Statistics Branch, U.S. Office of Education.

GENERAL NATURE OF THE PROJECTIONS

Long-range projections of college enrollment for the Nation are essentially based on a projection of the population by age, and a projection of college enrollment rates applied to the projected population by age.

In addition to the three projections of *total* college enrollment, the present report also introduces a tentative projection of full-time enrollments of college and university undergraduate students and students working for the first professional degree, thus providing a more nearly adequate guide to planning than has heretofore been available.

The projections on total enrollment shown here represent estimates of the number of persons enrolled in the fall of the year in institutions of higher education for degree-credit courses. The figures are a continuation of the series of statistics on opening enrollment collected by the Office of Education from institutions of higher education each fall, which are similar to enrollment data collected by the Bureau of the Census each October in the course of a nationwide sample survey of households. Three projections are shown:

Projection I—trend projection—is based on the trend of age-specific college enrollment rates during the 1950's as determined through fitting an exponential curve[1] to the data for the 1950–60 base period, and then applying these to the population by age groups. The population and enrollment rate data in the base period are taken from the annual October surveys of school enrollment conducted by the Bureau of the Census (Series P-20). The projected population is the same in all three projections and corresponds to Census Bureau projections of the population,[2] with minor adjustments.

Projection II—fathers' attainment projection—introduces on an experimental basis a projection of college and university attendance of sons and daughters based on the estimated educational attainment of their fathers. This projection in effect extends the application of the constant-rate principle by introducing an allowance for one of the many causal factors affecting college attendance rates. Various studies, including the study by Brazer and David presented later in this volume, indicate the singular importance of educational attainment of parents in determining the college attendance of their children. The method of translating the increasing educational attainment of fathers into projections of demand for college places for their children 18 to 24 years of age is presented in a later section of this chapter.

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[1] The type of curve fitted to the data on enrollment rates affects the projected enrollments to some extent. For example, straight lines fitted to the enrollment rates of the base period would have resulted in a higher projected enrollment than did the exponential curves actually used in these projections.

[2] U.S. Department of Commerce, Bureau of the Census. Current Population Reports, *Population Estimates. Illustrative Projections of the Population of the United States, by Age and Sex, 1960 to 1980.* Series P-25, No. 187 (Nov. 10, 1958).

Projection III—constant-rate projection—continues 1958–60 enrollment rates into the future, without change.

FUTURE PROSPECTS

Which projection is going to be closest to the future event? One answer might be: "It doesn't matter for policy planning, because the increases under any of the projections are sufficiently large to require the same kind of planning." A more usual answer is: "That projection whose basic assumptions hold true in the future." The term "projection" itself, and even more the term "illustrative projection," connotes a mathematical working out of specified assumptions rather than a forecast or prediction. Thus the original question is not answered directly but is shifted to another level. The question becomes: "Which set of basic assumptions is going to come true?"

These several projections provide the user of the information with an idea of the variations under different circumstances. In general, the constant-rate projection serves mainly to illustrate the effect of population change. Because various forces have in the past expanded enrollment beyond that caused by population increase alone, this projection results in a relatively low set of figures. Projection II, based on the enrollment of young people as affected by the educational attainment of their fathers, takes account of one factor among many, but this projection too results in low figures relative to the trend because of the other factors that have operated to increase the attendance rates during the period 1950–60. The trend projection assumes that whatever causal factors determined the attendance rates in the past will continue to operate equally in the future.

College and university enrollment in the future will be affected by many factors that are difficult to foresee. Therefore, while the three projections may provide a guide to the changing demand for college places, they do not necessarily set the limits, either on the high side or on the low side of what may be experienced. We in the United States could alter our educational policies and move in the direction of England's policies and those of some other nations so as to restrict college opportunities sharply. Or, as seems more likely, we could plan to allocate sufficient resources to provide higher educational opportunities to an even larger proportion of our young adults than is projected by extrapolation of the experience of the 1950's.

OPENING ENROLLMENT, PAST AND PROJECTED

Enrollments for degree credit in colleges and universities totaled 3.6 million in the fall of 1960 (in 48 States and the District of Columbia—see table 1). According to projection I, the *trend* projection, they are expected to rise to 6.9 million by 1970 and to 8.6 million by 1975. To meet this demand, institutions of higher education will have to accommodate an average of 335,000 additional students each year over the 15-year period. Soon after 1970, colleges and universities will have twice as many students as they had in 1960 if existing trends in attendance rates continue.

According to the *constant-rate* projection, which takes account only of changes in college age population, fall college enrollment is expected to increase about half as much as in the *trend* projection; namely, an increase of 2.4 million students from 1960 to 1975, or an average increase of 157,000 per year.

TABLE 1.—Fall enrollment 1950–1960 and projections 1965, 1970, 1975, by sex, 48 contiguous States and District of Columbia

[In thousands]

Year	Total	Men	Women
1950	2,281	1,560	721
1951	2,102	1,391	711
1952	2,134	1,380	754
1953	2,231	1,423	808
1954	2,478	1,590	888
1955	2,695	1,770	925
1956	2,918	1,911	1,007
1957	3,037	1,985	1,052
1958	3,226	2,092	1,134
1959	3,365	2,154	1,211
1960	3,570	2,249	1,321
	PROJECTION I. TREND PROJECTION		
1965	5,203	3,414	1,789
1970	6,936	4,608	2,328
1975	8,588	5,755	2,833
	PROJECTION II. FATHERS' ATTAINMENT PROJECTION		
1965	4,649	3,037	1,612
1970	5,940	3,929	2,011
1975	7,067	4,700	2,367
	PROJECTION III. CONSTANT-RATE PROJECTION		
1965	4,322	2,837	1,485
1970	5,188	3,461	1,727
1975	5,921	3,989	1,932

SOURCE: 1950–60 Office of Education annual surveys of opening enrollment in institutions of higher education.

If enrollment rates for persons aged 18-24 are adjusted in accordance with the changes in the educational attainment of fathers (projection II), the projected demand is intermediate between that of projection I and III. Under this estimate, fall college enrollment in projection II is expected to increase about three-quarters as much as in the *trend* projection, with the result that 1960 enrollment is doubled by 1975 instead of shortly after 1970 as in the *trend* projection.

Some perspective can be gained on the magnitude of the educational task before colleges and universities through a comparison of the rates of growth during the decade of the 1950's with the projected growth. Between 1950 and 1960, degree credit enrollment in the colleges and universities rose 1.3 million, from 2.3 million to 3.6 million, or almost 60 percent. In a single year, 1959 to 1960, enrollments increased 6 percent. Over the period 1950-60 the enrollment increases averaged 129,000 students a year, and if we start the comparison from 1951 (because of the decline between 1950 and 1951) the growth in number of students averaged 163,000 a year.

Little of the enrollment increase in recent years is explained by population growth. For example, if college attendance rates had not increased but had remained constant from 1950-52 to 1958-60, the number of men enrolled would have increased by only 8 percent, and the number of women by less than 1 percent. During this 8 years of change, however, the number of male and female students rose by about 40 percent.

POPULATION CHANGES—PAST AND PROJECTED

As a consequence of the sharp rise in births after World War II, increases in the number of persons of college attendance age will be much larger in the years ahead than in the past decade. The numbers of young people reaching 18 years of age, the usual age of high-school graduation, thus can be expected to rise in proportion to the post-World War II birth rates.

The rise in total college-age population is more difficult to pinpoint. Because there is no simple definition of college-age population, it is hard to give a meaningful answer to the question frequently raised, "What percentage of the college-age population is attending college?" A definition of college-age population limited to those in the age group 18 to 21 years, or even 18 to 24 years, leaves out many students in colleges and universities. The age span of students ranges from a few as young as 15 years of age to persons of retirement age. Table 2 shows that in the 1950's, among persons 16 to 34 years of age enrolled in colleges or universities, about 25 percent of the men and 12 percent of the women were 25 to 34 years of age. On the other hand, the population aged 16-34 is much too extensive to be used as a "college age" population for comparison with enrollments because it includes many persons whose formal education has been terminated for years and some who have neither the ability nor the inclination to do college work.

TABLE 2.—Percentage distribution of college students 16–34 years of age, by age group and sex, 48 contiguous States and District of Columbia: 3-year averages, 1952–60

3-year average,¹ by sex	Total, 16–34 years	16–17 years	18–19 years	20–24 years	25–29 years	30–34 years
MEN						
1952–54	100	5	27	41	20	6
1955–57	100	4	27	41	22	7
1958–60	100	4	30	40	19	8
WOMEN						
1952–54	100	11	41	36	6	7
1955–57	100	10	41	36	8	5
1958–60	100	10	45	32	8	5

¹ Ages as of October each year; averages for several years are averages of the individual years included.

Details may not add to totals because of rounding.

SOURCE: Based on Bureau of the Census surveys of school enrollment (Series P–20).

One way to describe the relationship of college enrollment to population is to cite the percentage of persons in particular age groups that are enrolled in college; such data are reported annually by the Bureau of the Census and are discussed in a later section of this chapter. Another way is to summarize the overall effect of population changes by applying standard attendance rates to the changing population, as is done here in the constant-rate projection (projection III).

The extent to which population growth affects the projected figures may be gaged from the *constant-rate projection.* When the *trend* projection is set against the *constant-rate projection,* we find that in the *trend* projection, 47 percent of the total growth in enrollment from 1960 to 1975 is attributable to an increase in the number of persons aged 16–34, and the remainder is attributable to increased enrollment rates.

ENROLLMENT RATES, PAST AND PROJECTED

In the period 1958–60, almost one-third of the men 18 to 19 years of age in the United States and one-quarter of the women in this age group were attending college (see table 3). In 1950–52, the comparable percentages among the 18- and 19-year-olds were 21 percent for the men and 15 percent for the women. Enrollment rates for each of the age groups, except the 16–17 year group, increased markedly between 1950 and 1960.

TABLE 3.—Percent of the civilian noninstitutional population age 16 to 34 enrolled in college in selected years, 1950–60, and projections, 1965, 1970, 1975, by age and sex, 48 contiguous States and District of Columbia

Year by sex¹	16–17 years	18–19 years	20–24 years	25–29 years	30–34 years
MEN					
3-year averages:					
1950–52	1.5	20.7	14.2	4.7	1.3
1958–60	3.3	32.7	19.3	8.4	3.0
PROJECTION I—TREND PROJECTION					
Projection years:					
1965	3.3	39.2	22.9	10.6	4.0
1970	3.3	43.7	25.1	11.9	4.7
1975	3.3	47.5	27.0	12.9	5.2
PROJECTION II—FATHERS' ATTAINMENT PROJECTION					
1965	3.3	35.6	21.2	8.4	3.0
1970	3.3	37.9	23.0	8.4	3.0
1975	3.3	39.8	24.8	8.4	3.0
PROJECTION III—CONSTANT-RATE PROJECTION					
1965, 1970, 1975	3.3	32.7	19.3	8.4	3.0
WOMEN					
3-year averages:					
1950–52	4.4	15.1	4.1	0.5	²0.5
1958–60	4.2	22.2	6.8	1.6	1.0
PROJECTION I—TREND PROJECTION					
Projection years:					
1965	4.2	26.0	8.6	2.4	1.2
1970	4.2	28.9	9.7	2.8	1.4
1975	4.2	31.4	10.5	3.2	1.5
PROJECTION II—FATHERS' ATTAINMENT PROJECTION					
1965	4.2	24.4	7.6	1.6	1.0
1970	4.2	26.4	8.3	1.6	1.0
1975	4.2	28.2	8.8	1.6	1.0
PROJECTION III—CONSTANT-RATE PROJECTION					
1965, 1970, 1975	4.2	22.2	6.8	1.6	1.0

¹ Ages as of October each year; averages for several years are averages of the individual years included.
² 1953 figure.

SOURCE: 1950–1960 Bureau of the Census surveys of school enrollment (Series P-20).

The percentage of the population attending college is highest for the 18–19 year age group, and enrollment rates drop off successively to a rate of 3.0 percent for men aged 30–34 and 1.0 percent for women. Of the youngest group, 16–17 years, only a small number are enrolled in college; most boys and girls of that age are still in secondary school.

The effect on college enrollment rates of the Veterans' Administra-

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tion program under the GI bill of rights cannot be worked out in detail because no one knows how many of the students attending would have enrolled in the absence of such a program. An idea of the upper limit to the possible effect of this factor may be supplied by making the assumption, admittedly extreme, that none of the beneficiaries under the program in November 1960 (numbering 180,000) would have been in college except for the opportunity provided by that program. Then the maximum reduction brought about by omitting such students from the constant-rate projection would be 300,000 in 1975, or about 5 percent of the 5.9 million students projected for that year. Corrections in projections I and II would be even slighter, since the omission of such beneficiaries during the entire base period would give a sharper rise to the upward trend of enrollment rates.

FULL-TIME ENROLLMENT—PAST AND PROJECTED

For purposes of planning it is advantageous to have more detail than is provided by a projection of total degree-credit college enrollment as given in the preceding tables. The most generally useful breakdown, among those that are feasible at the national level, appears to be that of full-time versus part-time enrollment because of the importance of this distinction in estimating the requirements for college faculty, facilities, and finances to handle the enlarged enrollment. For example, part-time students do not necessitate new facilities proportionate to the numbers enrolled, and for evening students no new facilities may be needed. Accordingly, a tentative projection of enrollment of full-time undergraduates and graduates working for the first professional degree is developed here. The term "tentative" is used to describe this projection because the available historical data upon which to base the projection are themselves scanty.

The projected figures in table 4 are a continuation of the series of statistics on full-time enrollment at the undergraduate and the first professional level[3] as collected by the Office of Education in 1953, 1954, 1955, 1957, and 1959. Full-time students are defined as those registered for at least 75 percent of the credits required for graduation in the normal number of semesters or terms. Full-time graduate students other than those at the first professional level are not included in the projection because they are missing in the trend data; however, we know that in the fall of 1959 this omitted group of full-time students included about 130,000 graduate students (resident degree-credit students) who were not enrolled for the first professional degree. Had these been added to the full-time undergraduate and first professional students, the 1959 figure would have increased by 6 percent.

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[3] In addition to those enrolled for bachelor's degrees, first professional degrees in such fields of medicine and dentistry (M.D. and D.D.S.), law (LL.B.), theology (B.Th.), library science (M.L.S.), and social work (M.S.W.) which normally require more than 4 years of post-high-school education for completion.

One very important question is whether the expected growth in full-time enrollment is parallel to that for total enrollment. If not, the changes in total enrollment are not a reliable guide to the changes in the educational load on the colleges and universities. The findings are, however, that projected full-time enrollment (undergraduate and first professional) as a percentage of projected total opening enrollment varies only moderately—from the 65 percent observed in 1959, dropping only to 60 percent by 1975 in the *trend* projection and rising to 68 percent in the *constant-rate* projection (see table 4). The rise in this percentage in the case of the *constant-rate* projection is due to the relatively greater weight of the population of the younger ages in future years, as compared with the population of the older ages. Full-time enrollment is concentrated in the younger age group.

TABLE 4.—Full-time undergraduate and first professional enrollment, fall of selected years 1953–1959 and projections, 1965, 1970, 1975, by sex, 48 contiguous States and District of Columbia

[Enrollment in thousands]

Year	Total		Men		Women	
	Number	As percent of opening enrollment	Number	As percent of opening enrollment	Number	As percent of opening enrollment
1953	1,556	70	1,002	70	554	68
1954	1,681	68	1,100	69	584	65
1955	1,852	69	1,234	70	617	67
1957	2,038	66	1,360	67	678	64
1959	2,189	65	1,408	65	781	64
PROJECTION I TREND PROJECTION						
1965	3,389	65	2,240	66	1,149	64
1970	4,354	64	2,908	65	1,446	62
1975	5,138	60	3,447	60	1,691	60
PROJECTION II FATHERS' ATTAINMENT PROJECTION						
1965	3,121	67	2,092	67	1,029	66
1970	3,863	65	2,574	65	1,289	64
1975	4,395	62	2,923	62	1,472	62
PROJECTION III CONSTANT-RATE PROJECTION						
1965	2,937	68	1,938	68	999	67
1970	3,522	68	2,367	68	1,155	67
1975	3,966	67	2,685	67	1,281	66

Details may not add to totals because of rounding.

Full-time undergraduate and first professional enrollment is shown in projection I to increase by 2.9 million, from 2.2 million in 1959 to 5.1 million in 1975, or an average of 184,000 per year. From 1959 to 1970 the number doubles. The increase in full-time enrollment in projection III is 1.8 million, or an average of 111,000 per year—an increase of 81 percent. Of the total increase from 1959 to 1975 in projection I, 60 percent is attributable to population growth.

As was previously mentioned, younger college students predominantly attend full time; older ones, part time. For example, as shown in table 5 (based on census data for all full-time college students 16 to 34 years of age) about 90 percent of the students aged 16–17, 18–19, and 20–24 attend full time, but only 17 percent of those aged 25–34. Table 5 also shows that only 12 percent of the full-time men students are older than 24, but 64 percent of the part-time. Even more striking is the difference in the ages of women attending full and part time; only 3 percent of the full-time women students are over 24 years of age, but 44 percent of the part-time.

TABLE 5. **Full-time college enrollment (all levels) as percent of total college enrollment, and age distribution of full-time and part-time college students, by sex, 48 contiguous States and District of Columbia: 1958–60**

Year, sex, and full-time or part-time status	Total 16-34	16-17 years	18-19 years	20-24 years	25-29 years	30-34 years
	FULL-TIME COLLEGE ENROLLMENT (ALL LEVELS) AS PERCENT OF TOTAL COLLEGE ENROLLMENT					
Average, 3 years, 1958–60:						
Men	73.7	94.7	93.7	81.8	[2] 40.2	[2] 17.5
Women	77.3	89.1	92.1	76.2	[2] 20.9	[2] 17.4
	PERCENTAGE AGE DISTRIBUTION OF FULL-TIME AND PART-TIME COLLEGE STUDENTS 16-34 YEARS OF AGE					
Average, 2 years, 1959–60:						
Men:						
Full-time	100.0	5.4	39.1	43.5	10.1	1.9
Part-time	100.0	.9	7.0	28.2	39.9	24.1
Women:						
Full-time	100.0	12.2	54.3	30.3	2.0	1.2
Part-time	100.0	3.7	15.6	36.7	25.4	18.6

[1] Ages as of October each year; averages for several years are averages of the individual years included.
[2] Average of 1959 and 1960; 1958 figure not available.

Source: Based on Bureau of the Census surveys of school enrollment (Series P-20).

The method of deriving full-time enrollment from the projections of total enrollment involves essentially application of the current percentages of college students enrolled full time to the projected total enrollment by age group and sex. The results are summed and translated into the figure for undergraduate and first professional full-time enrollment by a conversion factor. For the *constant-rate* projection (projection III) the conversion factor is a constant based on the current relationship; for projections I and II the conversion factor decreases over the period of the projections in accordance with the change in the relation of full-time to total enrollments in the base period 1953 to 1959.

PROJECTION BASED ON FATHERS' EDUCATIONAL ATTAINMENT

The educational attainment of the fathers of college-age persons represents an exogenous variable relative to college attendance rates; that is, it represents an outside causal factor. It is only one of a number of causal factors affecting college attendance that might be considered, such as family income distribution, color, geographic location, scholarships and loans, intelligence, and availability of college opportunity. The factor, educational attainment of fathers, has three characteristics, not matched by these other factors, that recommend it for use in projecting college enrollment rates:

(1) It can probably be predicted with greater accuracy than college enrollment rates themselves.

(2) It is correlated with such rates, and it may be assumed that the relation is causal rather than adventitious.

(3) It has changed over past years and is projected to change further during the period ahead.

Since the method is new, the procedure is explained here in detail. It is as follows:

In essence, future college enrollment rates for persons in the age groups 18–19 and 20–24 are assumed to remain the same as they are now *in relation to fathers' educational attainment*. The higher educational attainment of the fathers of the future age groups thus results in an increased enrollment rate for these age groups as a whole. College enrollment rates used for persons under 18 years of age and for those 25 years of age and over were kept at the 1958–60 rates (the same as in projection III).

The more specific steps by which this is accomplished are as follows (the critical assumption is stated in step 2 and is discussed later):

(1) The educational attainment of the fathers of persons aged 20–24 in 1960 is known.

(2) The educational attainment of the fathers of future groups aged 20–24 is assumed to rise in accordance with the rise in educational attainment of the male population aged 45–54.

(3) College attendance rates for 1960 (according to fathers' educational attainment) for the population aged 20–24 are applied to future populations aged 20–24 (according to fathers' educational attainment) to estimate the future college attendance of persons 20–24 years old in future years.

(4) We also know the percentage of the 20–24 population in 1960 who had ever attended college, regardless of whether they were still enrolled as of 1960. These 1960 percentages according to fathers' attainment are applied to future populations aged 20–24 according

to fathers' attainment to estimate the future percentage of this age group that may be expected to have attended college.

(5) It is assumed that the future changes in the percentage of persons 18–19 years old enrolled in college will be proportional to the future changes in the percentage of persons 20–24 years old ever attending college, as estimated in step 4.

(6) For other age groups (16–17, 25–29, 30–34) the future attendance percentages are those reported in 1958–60, the same as in the *constant rate* projection. Thus, projection II makes no allowance for increased attendance rates in the age group 25–34, even though the rates have risen somewhat during the 1950's. Not only are the data lacking concerning the educational attainment of the fathers of these persons, but also it may be doubted whether in that age group the fathers' attainment is directly influentional as much as in the lower age groups.

Table 6 shows the college attendance experience of the population aged 20–24 in 1960 according to the educational attainment of their fathers. The table shows the percentage of persons 20–24 enrolled in college as of October 1960 and also gives the percentages of those who ever had been so enrolled. The relation between college attendance and father's educational attainment is obviously a strong one. Other studies have abundantly confirmed this fact.

TABLE 6.—Percent of civilian noninstitutional population aged 20–24 enrolled in college currently or previously, by fathers' educational attainment, and by sex, 48 contiguous States and District of Columbia, October 1960

Fathers' educational attainment	Current college status			Current and previous college status		
	Total	Enrolled	Not enrolled	Total	Enrolled at some time	Never enrolled
	MALES AGED 20-24					
Total	100	20	80	100	36	64
Not a high school graduate [1]	100	12	88	100	23	77
High school graduate, no college	100	28	72	100	54	46
Some college, not a college graduate	100	41	59	100	70	30
College graduate	100	62	38	100	88	12
	FEMALES AGED 20-24					
Total	100	7	93	100	25	75
Not a high school graduate [1]	100	4	96	100	15	85
High school graduate, no college	100	9	91	100	36	64
Some college, not a college graduate	100	24	76	100	67	33
College graduate	100	21	79	100	77	23

[1] Includes cases where fathers' attainment was not reported.

SOURCE: Bureau of the Census survey of school enrollment, October 1960 (Series P-20).

Table 7 shows the educational attainment of all males in the Nation aged 45–54 in 1960, together with projections of the attainment of this age group in 1970 and 1980 as made by the Bureau of the Census. This projection can be made with considerable accuracy because most of the persons involved have already completed their formal education. The primary problem is one of getting data for the base period. Examination of the figures shows a very substantial increase in the educational attainment of males aged 45–54; particularly noteworthy is the decline in the proportion of men of this age with less than 4 years of high school—from 63.7 percent in 1960 to 41.7 percent in 1980. At the same time the proportion of those who have had some college education rises from 16.0 percent to 25.5 percent.

Table 7 also shows the educational attainment of the fathers of persons aged 20–24 in 1960, and the estimated attainment of the fathers in 1970 and 1980, assuming that the educational attainment of fathers changes in proportion to that of all males 45–54. This is the assumption mentioned previously in step 2.

TABLE 7.—Estimated percentage distribution by educational attainment of (*a*) males 45–54 years of age, and (*b*) fathers of persons 20–24 years of age, 48 contiguous States and District of Columbia: 1960, 1970, 1980

Year	All males 45–54 years of age	Educational attainment of males 45–54 years of age: Less than 4 years of high school	4 years of high school	1–3 years of college	4 or more years of college
1960	100	63.7	20.3	7.6	8.4
1970	100	50.0	30.2	9.3	10.5
1980	100	41.7	32.8	11.6	13.9

Year, by sex and age	All fathers of persons 20–24 years of age	Education attainment of fathers of persons 20–24 years of age: Not a high-school graduate [1]	High-school graduate, no college	Some college, not a college graduate	College graduate
Sons 20–24 years of age					
1960	100	70.0	17.4	5.6	7.0
1970	100	56.9	26.8	7.1	9.1
1980	100	48.7	29.9	9.1	12.4
Daughters 20–24 years of age					
1960	100	71.8	16.4	5.1	6.7
1970	100	59.0	25.5	6.6	8.8
1980	[2]100	50.8	28.7	8.5	12.0

[1] Includes cases where educational attainment was not reported.

[2] Details may not add to totals because of rounding.

SOURCE: Attainment of males as of July from Bureau of the Census projection of educational attainment (Series P-20, No. 91, Jan. 12, 1959). Educational attainment of fathers as of October 1960 from Bureau of the Census survey of school enrollment.

CALCULATION: Fathers' attainment in 1960 projected to 1970 and 1980 at same rate of change as for males 45–54 years of age, and then adjusting to 100 percent.

In support of the assumption it may be noted that the educational attainment of fathers and that of all males 45–54 years of age were very similar in 1960. Moveover, the use of age group 45–54 does not seriously impair the estimate. The age group was selected for convenience because it had already been projected; other age groups such as 40–55 would be expected to have similar increases in attainment. The basic point is that a specific age group, whatever the exact age composition may be, is taken to represent the fathers of the population aged 20–24 in 1960, 1970, and 1980, insofar as changes in educational attainment are concerned. This assumption would not be correct if, for example, (*a*) fathers of the population aged 20–24 in future years are a younger group than now, or (*b*) fertility of persons with higher educational attainment has increased more than that of persons with lower attainment. Either of these changes would be such as to increase the attainment of the fathers more than has been estimated and would thus tend to raise the figures shown in projection II.

Once the attainment of the fathers of persons aged 20–24 has been projected, the application to future populations of 1960 enrollment rates in relation to fathers' attainment, as described previously, is a simple matter.

Of course, fathers' attainment is only one of many factors related to attendance at college, albeit a major one. In the period from 1950 to 1960 only a part of the increase in college enrollment can be explained by increases in the educational attainment of the fathers of the students. For example, college enrollment rates for males aged 20–24 increased 6.3 percentage points, of which only 1.8 are attributable to changes in their fathers' educational attainment. For women aged 20–24, college enrollment rates increased 2.6 percentage points, of which only 0.6 point is attributable to changes in their fathers' educational attainment. Obviously, other factors also were effective during this period in raising attendance rates.

PROJECTIONS FOR 50 STATES AND FOR AGGREGATE UNITED STATES

The projections and tables up to this point have referred to the 48 contiguous States and the District of Columbia because the available basic population projections from the Bureau of the Census have been for this area. For the convenience of those desiring such coverage, projections for 48 States and the District of Columbia have been adjusted in table 8 to cover the 50 States and the District of Columbia, and in table 9 to cover the aggregate United States, including outlying parts (Canal Zone and Puerto Rico have college enrollments). The adjustment made is based on the current relation between the enrollment in the latter areas and the enrollment in 48 States and the District of Columbia. Separate conversion factors are applied for each sex, for both total enrollment and full-time enrollment.

TABLE 8.—Fall enrollment 1950–60 and projections 1965, 1970, 1975, total opening enrollment and full-time undergraduate and first professional, by sex, 50 States and District of Columbia

[In thousands]

Year	Opening enrollment			Full-time undergraduate and first professional enrollment		
	Total	Men	Women	Total	Men	Women
1950	2,286	1,563	723			
1951	2,107	1,394	713	…	…	…
1952	2,139	1,383	756	…	…	…
1953	[illegible]	[illegible]	811	1,557	1,004	553
1954	2,484	1,593	891	1,685	1,103	582
1955	[illegible]	[illegible]	929	1,856	1,237	619
1956	2,927	1,917	1,011			
1957	3,017	1,960	1,056	2,016	1,335	680
1958	3,236	2,098	1,138			
1959	3,377	2,161	1,216	2,196	1,412	784
1960	3,583	2,257	1,326			
PROJECTION I. TREND PROJECTION						
1965	[illegible]	3,424	1,786	3,369	2,216	1,153
1970	[illegible]	[illegible]	2,337	4,367	2,916	1,451
1975	8,616	5,772	2,844	5,155	3,457	1,698
PROJECTION II. FATHERS' ATTAINMENT PROJECTION						
1965	[illegible]	[illegible]	[illegible]	3,101	2,038	1,063
1970	[illegible]	3,911	2,019	3,856	2,562	1,294
1975	[illegible]	4,714	[illegible]	4,410	2,932	1,478
PROJECTION III. CONSTANT-RATE PROJECTION						
1965	4,337	2,846	1,491	2,947	1,944	1,003
1970	5,205	3,471	1,734	3,534	2,374	1,160
1975	5,941	4,001	1,940	3,979	2,693	1,286

SOURCE: Figures for 1950–60 from Office of Education surveys; those for 1965–75 converted from projections for the 48 contiguous States and the District of Columbia.

The total enrollment for the 50 States and the District of Columbia is shown, in projection I, to rise from 3.6 million in 1960 to 7.0 million by 1970, and in projection III to 5.2 million. Further increases may be expected to occur after 1970; projection I shows that by 1975 enrollment will be 2.4 times that of 1960 if attendance rates increase as they have in the past. Even if attendance rates remain at present levels (projection III), there will be 5.9 million persons enrolled in colleges and universities by 1975.

TABLE 9.—Fall enrollment 1950–60 and projections 1965, 1970, 1975, total opening enrollment and full-time undergraduate and first professional, by sex; aggregate United States (including outlying parts)

[In thousands]

Year	Opening enrollment			Full time undergraduate and first professional enrollment		
	Total	Men	Women	Total	Men	Women
1950	2,297	1,570	727			
1951	2,116	1,398	718			
1952	2,148	1,387	761			
1953	2,251	1,432	818	1,566	1,009	557
1954	2,500	1,602	898	1,696	1,109	587
1955	2,721	1,784	937	1,868	1,244	624
1956	2,947	1,928	1,019			
1957	3,068	2,003	1,065	2,030	1,344	685
1958	3,259	2,110	1,148			
1959	3,402	2,174	1,228	2,212	1,421	790
1960	3,610	2,271	1,339			
	PROJECTION I—TREND PROJECTION					
1965	5,257	3,445	1,812	3,423	2,260	1,163
1970	7,007	4,649	2,358	4,398	2,934	1,464
1975	8,677	5,807	2,870	5,191	3,478	1,713
	PROJECTION II—FATHERS' ATTAINMENT PROJECTION					
1965	4,697	3,064	1,633	3,123	2,050	1,073
1970	6,001	3,964	2,037	3,883	2,577	1,306
1975	7,140	4,742	2,398	4,442	2,950	1,492
	PROJECTION III—CONSTANT-RATE PROJECTION					
1965	4,467	2,963	1,504	2,967	1,955	1,012
1970	5,241	3,492	1,749	3,559	2,389	1,170
1975	5,982	4,025	1,957	4,006	2,709	1,297

Source: 1950–60 from Office of Education surveys; those for 1965–75 converted from projections for the 48 conterminous States and the District of Columbia.

RELATED ENROLLMENT SERIES

The estimates presented in this chapter can perhaps best be evaluated in terms of other series developed by the Bureau of the Census and by the Office of Education. It is worth while also to note briefly sources of information now available on full-time college enrollments and to comment on the relation of fall enrollment as of a single date in the year to the cumulative enrollment for the full academic year.

Census Bureau projections.—The U.S. Bureau of the Census has prepared illustrative projections of school and college enrollments to 1980 (Series P-25, No. 232). Table 10 presents the projections of total fall college enrollment for all of the series that were computed; the publication gives breakdowns of some of these series by age group and by sex.

The two principal series, A and C, present figures similar to the figures given here for projection I (*trend* projection) and projection III (*constant-rate* projection), respectively, as may be seen by comparing table 8 and table 10.

The Census Bureau projections were obtained in a manner analogous to that employed here. Projected trends in the percentage of an age group enrolled in school or college (based on different assumptions) were applied to projections of the population by age. The projected enrollment for each age group was then divided into elementary, secondary, and college enrollment in accordance with the present proportions for each age group.

The enrollment rate series differ with respect to the trend in the proportion of population at each age enrolled in colleges and universities. Series A implies a continued increase in enrollment rates by age with some leveling off by future dates; the base period for the trend is 1950–59. In series C it is assumed that enrollment rates will remain constant at the 1957–59 average annual level. Series B assumes rates roughly halfway between series A and series C. In series D, it is assumed that rates remain constant at 1957–59 levels through 1964, decline to the 1953–55 levels by 1974, and then remain constant at these levels to 1980.

TABLE 10.—**Bureau of the Census projections of fall college enrollment for the civilian noninstitutional population under 35 years of age, 50 States and District of Columbia: 1965, 1970, 1975, 1980**

[In thousands]

Population projection series [1]	Attendance rate projection [2]	1965	1970	1975	1980
II	A	5,379	7,020	8,325	9,018
III	A				8,815
IV	A				8,599
II	B	4,864	5,825	6,928	7,757
III	B				7,577
IV	B				7,389
II	C	4,375	5,261	6,028	6,507
III	C				6,342
IV	C				6,187
II	D	4,289	4,774	5,075	5,492
III	D				5,350

[1] Assumptions as follows: Series II—fertility constant at 1955–57 level; Series III—fertility declines to 1949–51 level by 1965–70, then constant; Series IV—fertility declines to 1942–44 level by 1965–70, then constant.

[2] Assumptions about enrollment rates as follows: Series A—increasing to 1975, then constant; Series B—average of A and C; Series C—constant at 1957–59 levels; Series D—constant through 1964, declining to 1953–55 level by 1974, then constant.

NOTE.—Corresponding figures for earlier years are estimated as 2,214,000 in 1950; 2,379,000 in 1955; and 3,570,000 in 1960.

SOURCE: Bureau of the Census, Illustrative Projections to 1980 of School and College Enrollment in the United States (P-25, No. 232).

The population series projections underlying these enrollment figures differ only with regard to the projected level of fertility; these differences in fertility are inoperative for college enrollments until after 1975 because the future college students up to that date have already been born.

The 5 additional years beyond 1975 are shown in these Census Bureau projections to be a period of continued enrollment growth; thus, the enrollment trend is upward for at least 20 years into the future.

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Other enrollment data.—The estimates presented earlier develop projections of full-time undergraduate enrollments, including as undergraduate enrollment first professional degree students. Historical information on full-time enrollments is available from two sources in addition to the data collected by the Office of Education as shown in tables 4, 8, and 9. The Bureau of the Census, in its sample surveys of school and college enrollments, collected data on the full-time status of college students, including both graduate and undergraduate students, for the fall of 1959 and the fall of 1960. Comparable data are not available from the sample surveys in earlier years. These figures define as full time those students taking 12 or more hours of class attendance during an average school week.

The periodical *School and Society* has published annually for many years statistics on full-time college enrollments, also including both graduate and undergraduate students. Although the coverage is not always consistent from year to year, the full-time data for 4-year colleges as reported in this survey move more or less parallel to the full-time enrollment statistics of the Office of Education and the Census Bureau.

It should be pointed out that fall college enrollments are decidedly smaller than enrollments for the entire academic year. Academic year figures include students enrolling after the fall report has been submitted. No estimate of projected academic year enrollments has been made because they cannot be related directly to population data by age groups. Moreover, the relation of academic year enrollments to fall enrollments has been erratic in the past so that the conversion from one to another is unreliable. Although much historical data for academic year enrollments are available, current surveys are emphasizing fall enrollment statistics.

The projection of college enrollment previously in use by the Office of Education for planning purposes anticipated 4,677,000 students in the fall of 1965 and 6,066,000 students in the fall of 1970 (48 States and the District of Columbia). The earlier estimates were almost exactly halfway between the *trend* projection and the *constant-rate* projection given in this chapter. This earlier projection was based on a procedure different from the projections developed here.

The new projections show a range of numbers based on differing assumptions with regard to rates of attendance. The method of projection has been improved by analysis of at least one causal factor, besides the usual analyses based on population trends for males and females. Furthermore, future full-time enrollments have been estimated for the first time. It is hoped that the estimates presented will provide a better basis for planning purposes than has been available heretofore.

CHAPTER 2

Social and Economic Determinants of the Demand for Education[1]

*Harvey E. Brazer and Martin David**

THE FORMAL EDUCATION of the majority of Americans who were born before 1905 ended before they reached high school. Only one-sixth of the people now 55 or more years of age attended college, and less than half of these hold a college degree. In striking contrast, only a small fraction (14 percent) of those born between 1926 and 1942 have failed to go on to high school or beyond. Indeed, of that generation which, for the most part, has concluded its schooling, almost one-third have gone to college. Thus in the course of two to three generations the proportion going to college has doubled. Moreover, on the basis of parents' expectations for their children's education, as reported in this study, it would appear that about two-thirds of the children born in the United States between 1943 and 1959 will seek education beyond high school. The trends indicated in table 1 suggest that within the past 50 years the educational attainment of the modal members of succeeding generations has moved up from less than a high-school education to 1 or more years of college.

This sharp raise in the level of educational attainment may be ascribed to a number of causal factors. One of them, certainly, has been the increase in real income of families in the United States. Within each succeeding generation a larger fraction of American families have been able to afford the costs involved in extending the education of their children through high school and college. Income has increased and families have become more aware of the social and economic importance of education. At the same time the age at which young people may legally leave school has been raised and educational facilities have been expanded.

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*Harvey Brazer prepared the research on which this article is based while professor of economics and research associate of the Survey Research Center at the University of Michigan. Martin David was study director for the research project and is now assistant professor of economics at the University of Wisconsin. The project was made possible through grants from the Ford Foundation and the U.S. Office of Education under its cooperative research program. The views expressed are those of the authors and do not in any way reflect the views of the sponsoring agencies.

[1] The findings of this study apply to persons who are heads of spending units. A spending unit is a group of persons related by blood, marriage, or adoption, living in the same dwelling unit, who pool their incomes for their major items of expense. If the spending unit contains a married couple, the head of the unit is the husband. Otherwise the head is the person who earns the most money.

As a consequence of the definition, four-fifths of all spending unit heads are men. The women who are heads of spending units are one-fifth of the adult female population of the United States.

TABLE 1.—Trends in educational attainment of spending unit heads in the United States: percentage distribution, by age

Educational level	Percent, by age and year of birth			
	55 and over (before 1905 ¹)	35-54 (1905-25 ¹)	18-34 (1926-42 ¹)	1-17 (1943-59 ²)
Total	100	100	100	100
No education	4	1	0	0
Elementary school	49	26	14	3
Some high school	17	23	23	
High school diploma	8	18	21	29
High school diploma, plus noncollege training	6	11	12	
College, no degree	9	10	18	10
Bachelor's degree	5	8	10	58
Advanced degree	2	3	2	

¹ Education attained by spending unit heads, estimated from a national probability sample of the United States taken in 1960. Differential mortality of highly educated and uneducated persons may produce some upward bias in the distributions.

² Education expected for children now in school. The percentages are based on a sample of the adult population of the United States, reported in *How People Pay for College*, by John B. Lansing, Thomas Lorimer, and Chikashi Moriguchi, Ann Arbor, Mich., Survey Research Center, University of Michigan, 1960, p. [illegible]

Another major factor has been the substantial movement of population from rural, agricultural environments to urban, industrial areas. This movement has brought a larger proportion of the population into communities in which educational facilities are more readily accessible and in which more education is demanded of those seeking employment and status.

Our rapidly advancing technology has provided a phenomenal increase in the demand for persons with high levels of education. Apparently the demand for persons with education beyond high school has kept pace with the supply, and there are no visible signs of a weakening in the market for college graduates.[2]

Increases in income, facilities, and demand for persons with education provide fertile conditions for increasing educational attainment in this country. But they do not explain the motivation that has produced the astounding increase in education. In this chapter some of these motivational factors will be explored.

This chapter is based on information collected in a survey of a nationwide probability sample of spending units in the United States, taken in March and April of 1960. Sampling procedures used in the "Patterns of Family Change" study from which these data are drawn are outlined in appendix A. Our approach is to present data from the survey that relate educational attainments in this country and offer a set of tentative hypotheses that might be used to explain the highly significant relationships observed in the data. As in all research, particularly research that depends on the personal interview for its basic data, many relevant factors relating to educational attainment have been excluded from the analysis both because of inherent limitations of the survey method and because of limitations of time and resources available for this particular investigation. We recognize that in several cases more detailed analysis would have been desirable and that many of the interpretations offered could equally well be replaced by alternative formulations.

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[2] See Herman P. Miller, ch. 9 of this publication. There are contrary views, such as that of Robert J. Havighurst, *American Higher Education in the 1960's*. Columbus, Ohio State University Press, 1960.

The chapter is divided into three parts. The first sets forth hypotheses about the manner in which motivation for education is generated within the family. The second tests these hypotheses against cross-sectional data that describe the educational accomplishments of children in relation to the characteristics and background of their parents. Also in the second part, educational attainments of families whose children are still in school or are preschoolers are contrasted with the families' educational aspirations. The third part offers some brief remarks on the realism of parents' aspirations for sending children to college.

I. Motivation for Educational Attainment—A Model

The transmission of levels of education from parents to children is impressive. If educational attainments are classified into three broad groups—grade school or less, some high school or high-school diploma, and at least some college—then almost three-fifths of spending unit heads report that they are in the same group as their fathers. This implies that the distribution of educational attainments is strongly influenced by the experience of the last generation; it also implies a strong mechanism for transferring the values and accomplishments of each generation to the succeeding generation.

We believe that this transfer is accomplished via three routes: (1) The motivation and values of the family create the atmosphere in which the children are reared. (2) The material and career accomplishments of the parents serve to demonstrate to the children the utility and importance of the parental values; the career failures of the parents may motivate children to reject parental values. However, such rejection is a less powerful motivating force than the positive accomplishments of parents. (3) The achievements of the parents influence the family income and assets, which become the resources for financing the higher education of children.

We cast these general notions into specific hypotheses about the relationships between the education of children and their parents' background. For the most part values held by the parents are measured indirectly by a set of indicators. Chart 1 illustrates the manner in which specific measures of the family's background relate to the model we have developed. The left-hand column of the chart lists some of the more obvious influences on educational attainments; the reader can easily suggest others. The right-hand column indicates variables that were measured in the 1960 survey and that might relate to the underlying influences on educational attainments listed in the left-hand column. In most cases the underlying influence is reflected in more than one measured variable—cultural norms stressing education would certainly be reflected in reference groups other than the religious group shown in the chart. Conversely, some of the measured variables, such as race, are associated with several underlying influences on education—availability of facilities, cultural norms, and lifetime income levels. In short, the chart provides a crude outline which we shall elaborate on in the discussion of our findings.

II. Factors Influencing the Education Actually Attained by Children of a Cross Section of the U.S. Population

Educational attainments of the children of the family were measured by the average number of grades completed by living children of the head who were finished with school at the time that the family was interviewed. This measure contains some downward bias: teenagers who have already dropped out of school are included in our average, while those who are continuing their education and will raise the average at some time in the future are not taken into consideration.[3]

Strictly speaking, the analysis of educational attainments reflects not only demand for education but also the supply of educational facilities available to children of the respondents in our sample at various times in the past. Only if we assume that the supply of educational facilities will continue to increase in much the same way as it has in the past can we extrapolate from the experience of this generation of children in relation to the background of their parents.

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[3] Other measures of educational attainments might have been more useful for a more elaborate analysis of the structure of demand for college places. For example, an analysis differentiating between the attainments of girls and boys would appear to be extremely useful, as there appear to be substantial differences in the aspirations for educating male and female children. Another useful distinction would be to differentiate characteristics of families whose children complete college from families whose children only attended college for 1 or 2 years.

A MODEL OF MOTIVATION AND EXPERIENCE INFLUENCING THE TRANSMISSION OF EDUCATION FROM GENERATION TO GENERATION

Education achieved by children.

Theoretical determinants of educational attainments	*Indicators or proxy variables*
Motivation of parents and their values:	
Need-achievement of the parents.	A measure of need-achievement of the head[1] based on perception of the relative desirability of various occupations.
Attitude toward hard work and self-help as the means for attaining desired goals.	Expressed evaluation of hard work as the means for getting ahead.
Cultural norms stressing education, expressed in religious, community, and social groups with which parents are affiliated.	Religious affiliation and participation in religious activities by the head.
Achievements of parents that demonstrate the effectiveness of values held by the parents:	
Actual educational accomplishment of both parents.	Education of the head, and education of his wife, if he is married.
Educational achievement of the parents relative to the achievement of the grandparents.	Difference in the education of the head and his or her father.
Career paths demonstrating impact of education on earning power and advancement.	Occupation of the head.
Past mobility of the head which indicates attempts on the part of the parents to improve their situation.	Whether head moved off a farm. Whether head moved to the North.
Successful planning of finances and other activities of the family.	Age of the head at the birth of his first child.
Availability of education:	
Existence of local facilities.	Region. Urbanization. Color.
Economic ability to send children to college:	Peak income of the head in past years, his education, his occupation.
a. Earning potential.	
b. Demands on income and their timing.	Age of the head at the birth of his first child. Number of living children of the head.

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[1] The head of the spending unit is the husband in units containing a married couple; otherwise the head is the major earner in the spending unit.

Average education attained by the children of respondents was related to the indicators shown in chart 1 by a multivariate statistical analysis. Education of the spending unit head proved to be the most important factor influencing the education of the children. In table 2 the relative importance of each of the indicators used to explain educational achievements of children is shown by the rank of its importance based on the beta coefficient of the indicator.[4] The beta coefficient is a standardized measure of the size of the effect of the indicator on the dependent variable. It takes into account both the differences between classes of the indicator and the distribution of the population among those classes.

Taken together, the explanatory variables account for two-fifths of the variance in children's completed education, as indicated by a coefficient of multiple determination, R^2, of 0.411. On the average, children who are finished with school received slightly less than 12 grades of schooling. The standard error of estimate of the result is 1.96 grades.

Parallel findings emerge from multivariate analysis of parents' aspirations for educating their children of school age. Aspirations are measured by answers to two questions: "How much education do you expect your boys to have before they stop going to school?" and "How much education do you expect your girls to have before they stop going to school?" The questions were asked of all heads of spending units with children aged 20 or under. The answers were coded according to the highest level of education mentioned.

Table 3 shows that two-thirds of the parents of boys and more than half of the parents of girls expect their children to attain some education beyond high school. These findings are roughly consistent with other studies of parents' aspirations for their children.[5]

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[4] The multivariate procedure is developed in *The Design and Analysis of Experiments*, by Oscar Kempthorne (New York, John Wiley & Sons, 1952, p. 91-110). The procedure is completely analogous to a regression procedure in which each classifying variable shown in our results is replaced by a set of dummy variables. (See "Use of Dummy Variables in Regression Equations," by Daniel B. Suits, *Journal of the American Statistical Association*, 52: 548-566, December 1957, and "An Analysis of Wages and Salaries in Great Britain," by T. P. Hill, *Econometrica*, 27: 355-381, July 1959.) The beta coefficients presented in this article are the standardized regression coefficients which obtain if each classifying variable is scaled according to the adjusted deviations shown in succeeding tables.

The *F* tests are calculated by treating the adjusted deviations associated with each classifying variable as a one-way analysis of variance with unequal cell sizes. The ratio of the variance explained by the adjusted coefficients to the variance unexplained by the entire multivariate procedure forms our estimate of *F*.

As the sample is clustered, sampling errors in the data exceed what would be expected from estimates assuming simple random sampling. Clustering is not as likely to affect the significance of multivariate relationships as it is likely to increase the sample errors of simple proportions and means. The consequence of clustering on the multivariate analysis is that the significance levels shown for *F* in the text somewhat exaggerate the true level of significance. Nevertheless it is highly likely that all relationships shown to be significant at the 0.01 level are truly significant. The number of cases on which each coefficient is based are included in the tabulations as a guide to the sampling error of the coefficient.

TABLE 2.—Characteristics of spending unit heads used to explain average number of grades completed by children[1]

Characteristics of the heads of spending units	Relative importance		Significance (F ratio)
	Rank	Beta coefficient	
Education	1	0.374	[2]28.02
Difference in education of heads and wives	2	.187	[2]8.90
Occupation	3	.153	[2]3.75
Number of children	4	.122	[2]5.96
North-South migration	5	.114	[2]3.47
Need-achievement index and attitude toward hard work	6	.104	[2]2.48
Peak earnings	7	.098	1.54
Religious preference and church attendance	8	.096	[3]2.11
Age at birth of oldest child	9	.091	1.90
Difference in education of heads and fathers	10	.087	[3]3.03
Color	11	.069	[3]3.81
Urban-rural migration	12	.045	.54
Age	13	.037	.55

[1] Calculated for spending unit heads who have children finished with school. Cases in which the education of children was not ascertained are excluded. Grades completed refer only to academic schooling with "some college" counted 13 years, "college degree," 16 years, master's degree, 17.
[2] Significant at a probability level of 0.01.
[3] Significant at a probability level of 0.05.

TABLE 3.—Percentage distribution of spending units with girls or boys aged 20 or under, according to the education level expected for them by their parents

Education level expected by heads of spending units	Index values	Percentage distribution for—	
		Girls	Boys
Total		100	100
Elementary school	1	0	1
Some high school	2	1	1
High school diploma	3	31	23
High school diploma, plus noncollege training	4	4	1
College, no degree	5	6	4
Bachelor's degree	6	49	58
Advanced degree	7	1	4
"Don't know" or general responses		5	5
Not ascertained		3	3
Average grades of schooling expected (interpolated from mean value of the index)		13.5	14.3
Mean value of index		4.8	5.1
Percent of spending units with children 20 years of age or younger		38	40

EDUCATION OF PARENTS AND GRANDPARENTS

The average education attained by the children, grouped according to the education of the spending unit head, is shown in table 4, column 2. Children of a head with no high-school training are likely to attain some high school training and children of a college graduate some college training. The third column of table 4 displays the difference between the average attainments given in column 2 and the grand mean. These "unadjusted deviations" exaggerate the impact of the head's education on the educational attainments of the children. The effects of income, color, and other factors that are correlated with education are included in the averages shown. Persons with high incomes are likely to be highly educated, so that the deviations may register the greater financial ability of educated persons to send their children to college as much as they reflect the transmission of ideas and parents' motivation for educating the children. Column 4 indicates the extent to which the children's education deviates from the average when effects that can be attributed to other factors are removed by multivariate adjustment. Thus column 4 is labeled "adjusted deviations." Column 5 shows the extent to which the multivariate estimates differ from simple tabulations of means. The differences display the extent to which simple tabulations include effects that can be traced to other variables. Columns 2 and 5 will be dropped from the remaining tables as the information in them can easily be derived from the remaining data.

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[5] Roper estimates that 69 percent of children below 18 years of age are expected by their parents to go to college. See Elmo Roper & Associates, *Parents' College Plans Study, The Education Program of the Ford Foundation*, 1959(?), p. 1. Data from Lansing, Lorimer, and Moriguchi, cited in table 1 of this chapter, show a similar figure.

TABLE 4.—Average grades of completed education of children, by education of the spending unit head, and deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Education of spending unit heads	Number of cases	Average education of children in this group (years)	Unadjusted deviations [1]	Adjusted deviations [2]	Difference, cols. 3 and 4
No education	29	9.14	−2.68	−1.60	−1.08
Elementary school	478	10.86	−.96	−.68	−.28
Some high school	177	12.01	.19	−.12	.31
High school diploma	92	12.81	.99	.98	.01
High school diploma, plus noncollege training	30	12.76	.94	.65	.29
College, no degree	57	13.90	2.08	1.65	.43
Bachelor's degree	35	14.70	2.88	1.89	.99
Advanced degree	16	15.72	3.90	3.06	.84

[1] Deviations (in grades) from the grand mean of 11.82 grades.
[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

Unadjusted deviations are shown in subsequent tables because they may represent the cumulative effect of a variable that is logically prior. For example, color is determined before birth. It affects education, occupation, and income: the unadjusted effects reflect the total impact of color on the educational attainments of children—an impact which is significant even though a good portion of the effect can be attributed to other variables.

The educational achievement of children does not increase systematically with every increase in the amount of schooling obtained by the head of the spending unit. High school graduates with nonacademic or vocational training have children with relatively less attainment than do those who are high school graduates with no vocational training. However, the vocationally trained have higher *aspirations* for their children. This inconsistency suggests that the attainments of children of the vocationally trained may rise in future years.

The pattern of adjusted deviations in table 4 offers two interesting results. First, it lends support to our hypothesis that motivation for the children to continue in school is directly related to the educational attainment of the parents. Children of more educated parents attain more education than the average, even after the results are discounted for the better economic situation of the family. Secondly, the results indicate some regression of children toward the average. Children of parents who did not finish grade school average some high school training, while children of college graduates average less than 3 years of college training. For parents with college training this result was to be expected. Not all children have the ability to complete a college course successfully, and only a small proportion of all children will continue after college with graduate work. The net result of less education attained by a few less able children is to lower the average of the entire group below an average attainment equal to the parent's college degree. The superior accomplishment of the children whose education exceeds their parents' grade-school training suggests that community influences motivate children to complete a minimum education no matter what their parents' background.

TABLE 5.—Average grades of completed education of children by the difference in educational attainment of parents; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Head's education compared with wife's [1]	Number of cases	Unadjusted deviations [2]	Adjusted deviations [3]
2+ levels less than wife	61	1.34	1.37
1 level less than wife	103	−.01	.46
Same level as wife	310	−.48	−.10
1 level more than wife	79	1.07	−.06
2+ levels more than wife	67	1.30	−.94
Education of wife not ascertained	9	.16	.09
Heads are single, widowed, or divorced [4]	310	−.42	−.11

[1] Levels of education are defined as:

No education	High school diploma, plus noncollege training
Grade school	College, no degree
Some high school	Bachelor's degree
High school diploma	Advanced degree

[2] Deviations (in grades) from the grand mean of 11.82 grades.

[3] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

[4] Heads of spending units include women whose husbands are not present and for whom the educational attainments were not ascertained.

The average education achieved by the children is also influenced by the educational achievements of the mother. The more education the wife has relative to her husband, the more education the children attain. Thus the education of both parents appears to stimulate education of the children. The adjusted deviations in table 5 suggest an asymmetry in the effect of differences in the parents' education. Where the wife has less education than her husband, achievements of the children are impeded, but not so much as they are advanced when the wife has more education than the husband.[8]

Children learn from, and are motivated by, the experiences of their parents. We assume they also recognize the educational achievements of their grandparents and use the experience of that generation to judge the value of an education. In cases where the grandfather has more education than either parent, we expect children to achieve more schooling than the parents' education would indicate. If the grandfather has less education than the parents, we should not expect the educational achievements of the children to be affected, although some regression to the accomplishments of the grandfather would not be surprising.

TABLE 6.—Average grades of completed education of children according to the difference in educational attainment of heads and their fathers; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Education of spending unit head compared with that of his father [1]	Number of cases	Unadjusted deviations [2]	Adjusted deviations [3]
Lower level than father	56	0.44	0.50
Same level as father	674	−.59	−.02
1 level more than father	129	1.09	−.37
2 or levels more than father	80	2.51	.39

[1] Levels of education used here were: grade school or less, education of father not ascertained; some high school or high school diploma; some college or college degree.

[2] Deviations in grades from the grand mean of 11.82 grades.

[3] Deviations in grades from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

The multivariate analysis confirms part of our hypothesis. Heads who have less education than their fathers have children who are likely to attain half a grade more schooling than the average (adjusted deviation). Where heads have achieved more education than the grandfather, however, both a positive and a negative deviation from the mean are shown. The negative effect could be interpreted as a regression of all children to an average level of education; the positive effect could be interpreted as the transfer of the parents' extremely high mobility to their children. The cause of a combination of these two effects is obscure.

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[8] By definition, certain combinations of head's education and difference in education of the head and wife cannot exist. For example, with the levels used in this survey, it is impossible for the head to have an advanced degree and his wife to report more education than he. Also by the nature of the definition, the two extreme groups on the scale typically include wives or husbands with a high-school education or more.

Virtually identical results emerge from multivariate analyses of aspirations for the education of younger children. The education of both head and wife is positively related to aspirations, much as in tables 4 and 5. The relationship between the grandfather's education and aspirations for children, unlike the result above, clearly indicates a pattern of regression to the attainments of the grandparents. Where heads have less education than their fathers, they aspire to relatively high attainments for both boys and girls; where the heads have more education than their fathers, their aspirations are relatively low.

OCCUPATION OF THE HEAD

Several interpretations of the relationship between occupation and educational attainment of children can be developed. One possibility is that the link between education and particular career lines is demonstrated to the children through the occupation and success of the breadwinning parent. Children may relate the ability of the parent to attain high status professional work, as in medicine, to his educational achievements. This would provide incentive for the children of professional and managerial workers to obtain more education than children of unskilled laborers.

An alternative interpretation of the results is that occupation serves as an indirect measure of the lifetime earnings of the family. Professional and managerial workers are better able to afford college education for their children than operatives or laborers. Some support for the latter interpretation comes from the fact that the occupation of the head bears little relationship to his aspirations for educating boys.

The differences between the adjusted and unadjusted deviations shown in table 7 exhibit clearly the advantages of the multivariate technique used to obtain the adjusted results. A simple set of averages attributes differences to occupation that the multivariate adjustment attributes to education and other dimensions. As a result, the adjusted effect of occupation is substantially smaller than the unadjusted effect.

SIZE OF FAMILY

The larger the family, the more demands upon its income for current needs and the less it can afford the double cost of sending children to college and forgoing the income that they can earn. Therefore we believe that the number of children born to the head should be associated closely and inversely with the average amount of schooling achieved by the children. Table 8 shows this effect clearly. The same effect is seen in the relationship between number of children and parents' aspirations for educating children.

TABLE 7.—Average grades of completed education of children by occupation; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Occupation of spending unit heads [1]	Number of cases	Unadjusted deviations [2]	Adjusted deviations [3]
Professional	59	2.60	0.32
Non-self-employed manager or official	30	2.17	.75
Self-employed businessman or artisan	62	1.04	.54
Clerical and sales worker	100	1.11	.49
Craftsman or foreman	124	.05	−.05
Operative	164	−.48	−.14
Laborer	219	−1.36	−.56
Farmer	103	−.75	−.13
Government protective worker	10	1.33	.06
Head has never worked or occupation was not ascertained	59	−.96	.13

[1] For the unemployed and retired, occupation refers to the type of work usually or formerly engaged in.
[2] Deviations (in grades) from the grand mean of 11.82 grades.
[3] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

NORTH-SOUTH MIGRATION

We would expect children of mobile families to have somewhat more education than children of immobile ones because mobile families have broader horizons and are probably more motivated to take advantage of economic opportunities. The variable that indicates whether the head of the spending unit moved between North and South was included in the analysis to test this notion.

TABLE 8.—Average grades of completed education of children, by number of living children of the spending unit head; deviations from the grand mean or 11.82 grades

[For spending unit heads whose children have finished school]

Number of living children of the spending unit head	Number of cases	Unadjusted deviations [1]	Adjusted deviations [2]
1 child	208	0.75	0.32
2 children	231	.45	.23
3 or 4 children	292	.03	−.07
5 or more children	208	−1.47	−.54

[1] Deviations (in grades) from the grand mean of 11.82 grades.
[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

The education of children in families that move from one area of the country to another appears to be more advanced than would otherwise be expected. Children of foreign-born parents and of parents who move out of the South achieve more education than would be expected on the basis of other characteristics of their parents.[7] In spite of the additional achievement, a gap of almost $1\frac{1}{2}$ years of education remains between the education of children of migrants from the South and the education of children of persons who have lived outside of the South throughout their lives (see the unadjusted deviations, table 9). Children of persons who migrate from North to South do not attain more education than is characteristic of the North, but their attainments do not drop to the average level that is characteristic of the South.

TABLE 9.—Average grades of completed education of children by North-South migration of the spending unit head; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

North-South migration of spending unit head	Number of cases	Unadjusted deviations[1]	Adjusted deviations[2]
Head grew up in non-Southern States:			
Living in South	121	0.24	0.07
Living out of the South	484	.42	.07
Head grew up in the Southern States:			
Living in South	201	−1.34	−.54
Living out of the South	38	−1.02	.06
Head grew up in foreign country	78	.35	.54
All others[3]	47	−.08	.16

[1] Deviations in grades from the grand mean of 11.82 grades.

[2] Deviations in grades from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

[3] Includes persons who grew up in more than 1 region of the country and persons whose region was not ascertained.

NEED FOR ACHIEVEMENT

Parents influence educational accomplishment by the value which they place upon overcoming obstacles and succeeding in the face of difficulties. This value is termed the need-achievement of the parents. An extensive body of literature relates need-achievement to success in school, perception of relative remuneration available in jobs of varying difficulty, and the objective opportunities for getting ahead in the world.[8] According to psychological theory, this value is transmitted to children at an early age, largely through early training of the children in independence. High levels of need-achievement will be reflected in the child's determination to compete successfully in the academic tests that permit entry to higher levels of education. Low levels of achievement motivation will be associated with a child's willingness to get by with an average or the minimum required performance.

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[7] Nearly half of the migrants to the North are Negroes.

[8] See *The Achievement Motive* by David C. McClelland, John W. Atkinson, Russell S. Clark and Edgar L. Lowell. New York, Appleton-Century-Crofts, 1953; also "Some Social Consequences of Achievement Motivation," by David C. McClelland, in *Nebraska Symposium on Motivation, 1955*. Lincoln, University of Nebraska Press, 1955, p. 41–65; also *Achievement Motivation and Occupational Mobility in the United States*, by H. J. Crockett, Jr. Ann Arbor, Mich., University Microfilms, 1961; also "Race, Ethnicity, and the Achievement Syndrome," by Bernard C. Rosen, *American Sociological Review*, 24: 47–60, February 1959.

Parents also motivate their children to educational attainment by their emphasis on working hard and their perception of success as the just reward for effort. This value will determine the extent to which the child feels effort pays off. Parents who feel that hard work brings little payoff are in a number of cases members of minority groups. For this reason they may not encourage their children to make the same effort as do parents who see the gates of opportunity open to persons with ability and talent who work hard.

TABLE 10.—Average grades of completed education of children, by the need-achievement index and head's attitude toward hard work; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Need-achievement index and heads' attitude toward hard work	Number of cases	Unadjusted deviations [1]	Adjusted deviations [2]
Hard work is equal to or more important than luck, need-achievement index is—			
High	190	0.96	0.32
Medium	334	.08	.03
Low	169	−.51	−.25
Hard work is less important than luck, need-achievement index is—			
High	34	1.29	.75
Medium	100	−.96	−.32
Low	72	−1.20	−.26
Need-achievement index was not ascertained	40	−.28	−.26

[1] Deviations (in grades) from the grand mean of 11.82 grades.

[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

In this analysis we have used an index of need-achievement based on the head's perception of the relative desirability of various occupations.[9] The index appears to make an independent contribution to the explanation of the level of education achieved by the children in the family. Children of parents who score high on the index achieve more schooling than do children of parents who score low. However, the head's attitude toward *hard work as a means of getting ahead in the world* does not have as strong an effect as we had expected. In spite of the belief that hard work is less important than luck in getting ahead in the world, a small group of persons who score high on the need-achievement index have children who perform well above the expectation based on their parents' characteristics. The children of this group attain more education than do the children of the group who feel that hard work is more important than luck. In the group who think hard work is less important than luck and who fall in the middle range on the need-achievement index, the children have less education than the average, and less than children of the group who feel that hard work is more important. This finding is what we would have expected on the basis of our hypotheses relating attitude toward work and educational achievement. For the remaining group it cannot be said that attitude toward work makes any difference in the educational achievement of children.

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[9] The index of need-achievement was derived from the following question: "We are interested in how people compare occupations. How do you think most people would feel if a boy of theirs chose each of these types of work?"

The occupations listed were carpenter, mail carrier, high school teacher, doctor, bookkeeper, auto mechanic, night watchman, bus driver, and drugstore owner.

Respondents rated the occupations in five classes ranging from "not happy" to "delighted." In theory, persons with high need for achievement will differentiate sharply in favor of high-reward, difficult occupations as opposed to low-reward, easy occupations; persons with low need-achievement will not differentiate as sharply in favor of the high-reward occupations and might even prefer low-reward, easier occupations. Therefore the slope of the relationship between the status-income ranking of the occupations and the ratings which were given for each occupation should indicate not only the extent to which the respondent differentiates high-status, high-income occupations from low-status, low-income occupations, it should also reflect the achievement motivation of the head. The slope was calculated for every spending unit head and used as the basis for the three need-achievement index groups shown in table 10.

The adjusted deviations related to the need-achievement index may reflect, as we suggest, differences in the early training and motivation that parents give to their children; other interpretations may be equally valid. The need-achievement index may measure the extent to which parents place high value on jobs that require substantial education and low value on those jobs which do not. It may also measure the intelligence of the respondent. In either case the same relationship to educational attainments would be expected.

The need-achievement index of the head appears to influence not only the *attainments* but also the *aspirations* of the head for educating his children. This finding suggests that differential expectations provide one force by which high levels of need achievement are translated into high attainments. However, the evidence does not support the hypothesis as consistently in this instance as it does in the analysis of completed education. Expectations for boys of parents who feel luck is more important do not vary in relation to the need-achievement index.

PEAK EARNING LEVELS

The maximum annual earnings received by the head of the spending unit were included in the analysis to measure the family's financial ability to send children through college. Though the relationship between level of peak earnings and children's education is somewhat irregular, the deviations are in the expected direction: high peak incomes are associated with more than average educational attainment.

TABLE 11.—Average grades of completed education of children by the peak earnings of the spending unit head; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Peak annual earnings of spending unit head	Number of cases	Unadjusted deviations [1]	Adjusted deviations [2]
$1–$499	21	−1.10	0.01
$500–$999	30	−1.74	−.38
$1,000–$1,499	66	−1.61	−.28
$1,500–$2,999	87	−1.03	−.32
$3,000–$4,999	178	−.24	.12
$5,000–$7,499	224	.34	−.01
$7,500–$9,999	52	1.03	.08
$10,000 and over	97	1.82	.37
Head never worked	65	−1.25	−.60
Earnings not ascertained	119	−.05	.19

[1] Deviations (in grades) from the grand mean of 11.82 grades.
[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

The failure of peak earnings to be more closely related to educational achievements can be ascribed to a number of conceptual and empirical factors. Peak earnings were thought to present the most favorable measure of earnings for retired persons and others whose incomes have declined since the period when their children were in school. However, the level indicated by peak earnings reported may be distorted by reporting errors; it may reflect atypical earnings during a very brief period; and it corresponds with disparate relative income positions for different cohorts in the sample. As a consequence, peak earnings do not necessarily reflect lifetime earning patterns and the ability of the family to support children in college. Education and occupation may be more closely associated with lifetime earning patterns. (See tables 4 and 7.)

In contrast to the relationship between peak earnings and educational attainments, the gross disposable income received by the spending unit in 1959 is the second most important determinant of the level of education expected for boys.[10] Its importance, however, is considerably smaller with respect to girls. Once the other variables have been taken into account, the level of education expected for boys in spending units with incomes between $1,000 and $1,999 is almost 1½ index levels (cf. table 3) below that expected by heads of spending units with incomes of $15,000 and over. The spread for girls, however, is only half as wide.

RELIGIOUS PREFERENCE AND ATTENDANCE

When religious groups are categorized according to the difference in the average income level of their members and the proportion of the members that are college graduates, a significant relationship appears between the affiliation of the parent and the educational attainment of the children. Children in families that attend church regularly attain a higher educational level than do children in families that attend church sporadically.

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[10] Gross disposable income includes estimates of income which the family earns from home production and the imputed rental value of its home as well as the usual elements of money income. An estimate of the unit's Federal income tax liability is deducted.

The relationship between the religious affiliation and the educational attainment of the children may be interpreted in a number of ways. The scale of religious affiliation may provide an indication of the ability of the parents to afford an education for their children; the scale may also measure the degree to which a particular reference group provides a standard of educational attainment which guides the parent in educating his children. Alternatively the scale may discriminate between different emphases on education among the three major categories. Without further evidence, which is not available in this body of survey data, we cannot say more about the validity of these interpretations.

TABLE 12.—Average grades of completed education of children by religious preference and church attendance of the spending unit head; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Religious preference and church attendance of spending unit head	Number of cases	Unadjusted deviations[1]	Adjusted deviations[2]
Family unit heads of Catholic preference, who attend church:			
2-4 times a month or more	122	0.23	0.08
Once a month or less	30	−.38	−.13
Family unit heads of Protestant preference:			
Fundamentalist Protestants[3] who attend church:			
2-4 times a month or more	211	−.55	.07
Once a month or less	170	−1.31	−.55
Non-Fundamentalist Protestants who attend church:[3]			
2-4 times a month or more	165	.95	.24
Once a month or less	213	.33	.09
Other religious preferences reported	48	.65	−.06

[1] Deviations (in grades) from the grand mean of 11.82 grades.

[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

[3] The division of religious sects of the Protestant faith was suggested by tables appearing in a study by Bernard Lazerwitz ("Some Factors Associated With Variations in Church Attendance," *Social Forces*, 39: 301-309, May 1961). Protestants were divided into two groups based on the average income and education of members of particular sects. This sociological distinction appears to correspond closely to doctrinal differences among Protestant groups as suggested by Lazerwitz.

AGE AT BIRTH OF FIRST CHILD

Age of the head of the family at the birth of his eldest living child was assumed as an indicator of the planning horizons of the family and also of its ability to finance the education of the children. Families who had children late would have opportunities to save and to earn income by having both the husband and the wife in the labor force, while the presence of a child born shortly after an early marriage tends at least temporarily to remove the wife as a source of family income, at the same time that it places a burden on the husband's income. Thus the variable employed in table 13 provides an index of both the planning horizons of the family and its ability to accumulate assets for sending children to college. While the deviations shown in the table are not highly significant, they are sufficiently systematic to support the hypothesis that the earlier a couple starts a family the less likely it is that their children will have a college education.

TABLE 13.—Average grades of completed education of children by age of spending unit head at birth of first child; deviations from the grand mean of 11.82 grades

[For spending-unit heads whose children have finished school]

Age of spending unit head at birth of 1st child	Number of cases	Unadjusted deviations[1]	Adjusted deviations[2]
No "own" children[3]	19	-0.39	-0.54
Under 18	42	-2.35	-.92
18-19	62	-1.12	-.41
20-24[4]	344	-.36	-.01
25-29	279	.45	.13
30-39	188	.76	.15
40 and over	25	.14	.00

[1] Deviations (in grades) from the grand mean of 11.82 grades.

[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

[3] Includes heads with adopted children and those whose responses were inconsistent.

[4] Includes spending unit heads whose age at birth of 1st child was not ascertained.

COLOR

Nonwhite children attained significantly less education than did white children.

The difference between the unadjusted deviation (-1.82) and the adjusted deviation (-0.52) for nonwhites implies that parents of nonwhite children are more likely to exhibit other characteristics associated with low educational attainment—for example, the parents are poorly educated and have low-paying occupations requiring little education. The adjusted deviations suggest racial differences in cultural values and in the availability of facilities, which account for more than half a grade of difference in educational attainments. The unadjusted deviations point out that the color differences produce a 2-year average difference in the completed education of children between white and nonwhite groups.

TABLE 14.—Average grades of completed education of children by color of spending unit head; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Color of spending unit head	Number of cases	Unadjusted deviations[1]	Adjusted deviations[2]
White	805	0.21	0.06
Nonwhite	134	-1.82	-.52

[1] Deviations (in grades) from the grand mean of 11.82 grades.

[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

Though whites and nonwhites have substantially different aspirations for educating their boys, the difference is associated with differences in the education, income, and other characteristics of the two groups, as the adjusted deviations contribute nothing to an explanation of parents' aspirations. The two groups agree more closely in their expectations for educating girls. But when expectations are adjusted for education, income, and other differences, nonwhites have significantly higher aspirations for girls. This finding may reflect the more strongly matriarchal nature of Negro society.

It is worth noting that nonwhites *attained* significantly less education than whites, although aspirations for educating boys are identical and aspirations for educating girls are somewhat higher among nonwhite parents. The discrepancy between attainment and aspirations may stem from the fact that heads of spending units whose children have not yet finished school are younger than those whose children have completed their education. Thus our finding is probably a consequence of the improvement in the status and opportunities open to the nonwhite that has occurred in this last generation.

RURAL-URBAN MIGRATION

On the average, persons who live in an urban area obtain somewhat more education for their children than those who live in a small town or a rural area. The children of persons who migrated from farms to the city attained somewhat more education than children of those who never moved. Though these effects parallel the effects shown for moving between North and South, they are so small as to be relatively unimportant.

TABLE 15.—Average grades of completed education of children, by rural-urban migration of the spending unit head; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Rural-urban migration of spending unit head	Number of cases	Unadjusted deviations [1]	Adjusted deviations [2]
Head grew up on farm; now lives—			
In rural area	235	−0.57	−0.06
In town 2,500–49,999	111	−.77	−.13
In city 50,000 or more	465	.33	.37
Head grew up in town or city; now lives—			
In rural area	131	.26	−.04
In town or city	309	.56	.02
All others [3]	28	.04	.03

[1] Deviations (in grades) from the grand mean of 11.82 grades.

[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

[3] Includes persons who grew up in several places and persons for whom locality was not ascertained.

AGE OF SPENDING UNIT HEAD

Age of the spending unit head was included in the analysis on the assumption that older persons, who were educated in a period when educational standards were lower than at present, might have less motivation for educating their children than younger parents. This notion is refuted by table 16. Apparently motivation does not vary systematically with the age of the parent.[11]

SUMMARY OF FACTORS INFLUENCING EDUCATIONAL ATTAINMENT

Tables 4 through 16 confirm many of the hypotheses which were sketched in chart 1. The positive associations between children's education and education of the parents and the need-achievement index of parental values suggest strong underlying values stimulating educational achievements. Occupation, peak earnings, age at birth of first child, and number of children probably derive a portion of their impact on attained education from their relationships to lifetime earning patterns and the ability to pay for higher education.

TABLE 16.—Average grades of completed education of children, by age of the spending unit head; deviations from the grand mean of 11.82 grades

[For spending unit heads whose children have finished school]

Age of spending unit head	Number of cases	Unadjusted deviations [1]	Adjusted deviations [2]
20-39	20	−1.57	−0.11
40-49	186	−.51	−.19
50-64	457	.32	.05
65 or over	206	−.03	.05

[1] Deviations (in grades) from the grand mean of 11.82 grades.
[2] Deviations (in grades) from the grand mean of 11.82 grades, with other factors controlled by multivariate adjustment.

III. The Realism of Educational Aspirations

We know that almost every American expects his children to finish high school. This expectation appears to have become firmly established as a minimum standard, one which contrasts sharply with the fact that at the turn of the century only 7 percent of the children aged 14 to 17 were attending high school. As we have seen (table 3), however, more than half of the parents of girls and two-thirds of the parents of boys expect their children to go beyond high school. Our

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[11] The small positive deviations shown for the older age groups follow from the fact that these are the groups which include most of the persons who had their children at a comparatively older age and whose children went to college. The younger groups, by definition, had their children early and did not send them to college. Thus, most of the effect shown for the unadjusted deviations is attributed to the age of the head at the birth of his first child.

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study permits us to say a good deal about the characteristics of spending unit heads that will produce a high potential demand for higher education in the future. Increasing educational attainments of parents; increasing incomes; increasing proportions of the labor force in professional, managerial, and other white collar occupations will lead to greater demand for higher education. This conclusion emerges quantitatively from several pieces of evidence.

We have already commented on the remarkable increase in educational attainments and the close relationship between parents' education and their children's academic training. Assuming that the step-up relationship will continue to hold for children born to the present generation, we can estimate than one-half of the next generation will have some college experience.[12]

TABLE 17.—Actual and projected education of children of spending unit heads under 35, according to education of the head and of head's father

Education of spending unit head	Education of head's father (percent)					Estimated education received by the children of spending unit heads under 35[2]
	No high school[1]	Some high school	High school graduate	Some college	Total[1]	
Total	100	100	100	100	100	100
No high school	21	5	2	1	14	5
Some high school	29	14	16	8	23	15
High school graduate	31	46	32	22	32	32
Some college	19	34	50	69	30	48
Percent of all spending unit heads represented in the tabulation	18	3	4	2	28	

[1] Includes heads whose education was not ascertained.
[2] See 1950 census data on education of children in relation to fathers' attainment and projections based on these data in Louis H. Conger, Jr., ch. 3 of this volume.

This finding is quite consistent with the Office of Education's projection that roughly 44 percent of all persons between the ages of 18 and 21 will be in college by 1970.[13]

A quantitative estimate of completed education of children in the coming generation can be obtained from the multivariate analysis presented in tables 4 to 16.[14] For any one family we can estimate the average completed education of their children by selecting the adjusted deviations appropriate to the particular characteristics of that family and adding them to the grand mean. To estimate the average completed education of children of a group of families, we must weight the average education obtained for each family by the number of children in the family. We have calculated such a sum of weighted averages for spending units with boys aged 20 and under. The average educational attainment projected is 12.1 grades. When this average is taken together with our projection of the distribution of education in the next generation, the result suggests that a large proportion of the students enrolling in colleges in coming years will not complete a full 4-year course.

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[12] The estimated distribution of education is obtained by multiplying the proportions in the "Some college" row of table 17 by the proportions in the total column of table 17 and adding the products; i.e., 19% × 14% + 34% × 23% + 50% × 32% + 69% × 30% = 48%. Estimates of the proportion who will be high-school graduates or high-school dropouts are obtained in the same fashion.

[13] As reported by Philip H. Coombs, "An Economist's Overview of Higher Education," in *Financing Higher Education, 1960–70*, Dexter M. Keezer, ed., New York, McGraw-Hill Book Co., 1959, p. 15.

[14] The estimates are based on the assumption that relationships developed from differences between individuals in a cross section reflect the true impact of individuation, rather than the peculiar impact of history on different persons in our sample. We know that in the population of persons who have children finished with school, there are some whose education was terminated by unusual events such as the depression of the 30's and

Comparing projections of past experience with parents' expectations for their children, we see that rises in parents' aspirations are roughly consistent with the rate at which educational attainments have been increasing in this country in the past half century. Clearly parents' aspirations to send their children to college are a natural consequence of their own experience and the desire to provide just a little bit more education for their children.

World War II. If conditions and events differ markedly in the next 10 to 15 years from those in the immediate past, or if colleges and universities change their practices markedly, the amount of education completed by the children who are now in school may differ from that estimated here on the basis of a cross sectional analysis of educational attainment.

The estimates may be slightly high, as the families with boys under 20 years of age are somewhat more likely to have additional children than the group with children who have finished school. As estimates of average births per married woman obtained from the "number of children" variable used in the projection agree closely with Bureau of the Census estimates of the same statistic, the bias cannot be important.

CHAPTER 3

The Need for Professional Personnel

*Seymour L. Wolfbein**

THERE ARE three overriding forces operating in this country which work toward a continued, and even an accelerated, demand and need for professional personnel. They join, in the decade of the 1960's, to accelerate this demand and need.

GROWTH OF THE SERVICE-PRODUCING, WHITE-COLLAR SECTORS

The *first* is the continued, evolutionary, structural change, industrially and occupationally, that contributes to the growth of the service producing, white collar sectors of the economy.

As background, the long-range trend is summarized in table 1.

TABLE 1.—Occupational distribution of employed population, United States, 1910, 1960, and 1970

Type of occupation	Percent of employed population, by year		
	1910	1960	1970
TOTAL	100	100	100
WHITE COLLAR	22	42	45
Professional and technical	5	11	13
Proprietary and managerial	7	11	11
Clerical and sales	10	20	21
BLUE COLLAR	37	37	36
Skilled	12	13	13
Semiskilled	14	18	18
Unskilled	11	6	5
SERVICE	10	12	13
FARM	31	9	6

SOURCE: Bureau of Labor Statistics, U.S. Department of Labor.

The persistence of these job trends has been emphasized in recent years even with alternations in overall economic activity. Events during the most recent recession are an example of these trends. In March 1961 there were a million fewer factory workers on industrial payrolls than in March 1960. Yet *total* nonfarm employment actually rose by 800,000 between those dates. During that period, the number in each of the major groups of manual or blue collar workers fell, but there was actually a million and a half employment increase among white-collar workers, about one-fourth of which was accounted for by the continued growth among professional and technical personnel over the year. In summary form table 2 shows what happened during this period.

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*Deputy Assistant Secretary of the Department of Labor, and Director of the Office of Automation and Manpower.

TABLE 2.—Persons employed in nonfarm occupation groups, March 1960 and March 1961

[In millions]

Occupation group	March 1960	March 1961
TOTAL	60.0	60.8
WHITE COLLAR	28.2	29.7
Professional and technical	7.0	8.0
Managers, officials	7.5	7.3
Clerical, sales	13.7	14.4
MANUAL OR BLUE COLLAR	23.5	22.5
Craftsmen, foremen	8.3	8.2
Operatives	12.0	11.3
Laborers, except farm and mine	3.2	3.0
SERVICE	8.2	8.6
Domestic	2.1	2.4
Other	6.1	6.2

SOURCE: *Monthly Report on the Labor Force*, March 1961, U.S. Department of Labor, Washington, D.C. p. 5.

INCREASE IN DEMAND FOR PROFESSIONAL AND TECHNICAL PERSONNEL

Current projections suggest about a 40-percent increase in employment among professional and technical personnel during the 1960's—on top of a similar expansion in the 1950's. This expansion is by no means an unrelated factor in the subject we are exploring. The *second* factor, then, is the very substantial rise in professional and technical employment that occurred during the past decade and that will be followed by another significant upturn in the immediate years ahead. This emphasizes not only the continued strong demand for professional and technical workers but also some of the pressure points involved in meeting that demand.

In the face of these anticipated demands, the current decade will see an actual diminution in the number of persons in the working population who are in the prime working age group 35–44 years. Many of these persons were born in the low-birth-rate depression years of the 1930's, and we are about to experience the impact of the events of those years. We face an almost unprecedented kind of manpower situation—enormous numbers of young workers, but an actual downturn in the number of workers in the age group 35 to 44. Thus the net labor force increase of 13.5 million during the 1960's will be distributed as follows:

Age group	*Percent*
14-24	47
25-34	13
35-44	−1
45-64	37
65 and over	4
Total	100

Since the smallest increases, and also, in fact, the decreases, are going to occur among workers in age groups that already have had some career development and experience—age groups from which we normally draw higher level professional personnel—the problem of meeting the overall demands in these fields is a difficult one.

ACCELERATION OF TECHNOLOGICAL CHANGE

The conjunction of an expected substantial increase in demand, with a rather unusual manpower situation on the supply side, is further marked by the anticipated accelerated developments in technological change during the 1960's.

Thus, our *third* factor ties the package together. The whole movement toward the white-collar, service-producing, professionally oriented structure in our economy is founded on the tremendous increases in productivity that have occurred in this country. Perhaps the best way of putting this is to say that the great productivity advances of the past have placed us in the position of *affording* to have the majority group in our working population engaged in service-producing activities rather than in goods-producing sectors. As we are the only country in the world in this position, there is nothing in the offing that points to anything but a continuation of demands for services which carry with them corresponding demands for professional personnel, accentuated by the many thresholds we apparently are scheduled to cross in the years immediately ahead.

We have entitled this brief summary statement "The Need for Professional Personnel." But we began, in our very first sentence, by talking about the "accelerating demand and need for professional personnel." Anyone using, in juxtaposition such as this, the terms "demand" and "need," makes overt his ambivalence, his hesitancy, his real doubts about the course of events in the immediate years ahead.

By "need" we really mean our aspirations—what we think ought to take place—in research and development, health services, teaching, architecture, and so forth.

By "demand" we really try to convey, as best we can, our realistic appraisal of what will actually occur, of how the needs will be tempered by forces such as availability of funds, our actual manpower situation, and our ability to utilize personnel effectively.

Obviously there are innumerable (and different) assessments of "needs" for professional personnel. Just as each individual has a standard of living to which he aspires and which he views in relation to his actual level of living, so, too, are there individual and group differences in the matter of needs and demands for professional and technical personnel.

It is a striking hallmark of our times that while there are differences of the sort we have just described, as well as differences in how, and in what mechanisms should be used, to bring demands and needs together—there is a significant amount of accord on the proposition that we have a long way to go to fulfill the *needs* of our current and projected population for the services of professional and technical personnel. Perhaps this is another way of saying that the aspirations, the expectations, of our society today are high indeed.

In the two following chapters an attempt is made, in a quantitative and qualitative way, to underscore the needs and demands for selected "professional personnel," "higher level personnel," "brainpower," and so forth.

It seems to us that the twin keys to discovering what we are after can be described briefly as follows:

The first is the overriding factor of change, whether it be in factory-systems management, weaponry and space research, medical diagnostics, economic and statistical computations, or teaching techniques. In these fields theory and practice have been subject to radical and frequent changes and will surely continue to be.

Under these circumstances, whether one talks of demands or needs, the critical factor is the great necessity for more and more professional personnel who are endowed with the maneuverability, the flexibility, the adaptability to respond with creativity to the changes to which we have just referred. This is the second key.

These two keys will open the door to an educational policy directed to flexibility in training professional and technical personnel, and to a labor management policy directed to efficient utilization of such manpower. These policies, in combination, will enable us to match "demands" and "needs" for such personnel.

CHAPTER 4

Health Manpower: An Illustration

*William H. Stewart, M.D.**

AMONG THE MOST IMPORTANT educational needs is the need for preparing workers in the field of health.

Early in World War II it became apparent that military demands for physicians, dentists, and nurses posed a serious threat to the health of the civilian population. So serious, indeed, that several remarkable educational innovations came about. Medical and dental schools accelerated their programs, so that the school year was shortened to 9 months, and five classes were graduated in the 4 years 1942–45. At the same time substantial Federal funds were invested in the cadet nurse program, which with scholarships increased enrollments so that the number of nurses graduated rose from 27,000 in 1943 to 41,000 in 1947.

By the war's end, most people apparently assumed that demobilization would provide the civilian population with enough health workers and the emergency programs were abandoned.

To the more critical, however, it was apparent that the problem was not to be so easily solved. Increasing population and increasing use of health services pointed even then to the need for expansion of training opportunities. A series of studies, including those of the National Security Resources Board in 1951,[1] and the President's Commission on Health Needs of the Nation in 1952 [2] pointed to a coming emergency.

The Nation's increasing need for health manpower is related to three major phenomena: growth of the population and change in its age distribution, increasing use of medical and hospital services, and changing patterns of medical practice and specialization.

It is expected that the population of the United States will exceed

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*Chief, Division of Community Health Services, Public Health Service, U.S. Department of Health, Education, and Welfare.

[1] Rusk, Howard A., Medicine, Mobilization and Manpower, in *Medical Education in the United States and Canada*, 1950–51, pt. II, Proceedings of the 47th Annual Congress on Medical Education and Licensure. Reprinted from *Journal of the American Medical Association*, 147 : 131–169, Sept. 8, 1951.

[2] U.S., The President's Commission on the Health Needs of the Nation, *Building America's Health:* vol. 1, ***Findings and Recommendations***, 1952 ; vol. 2, *America's Health Status, Needs and Resources*, 1953. Washington, D.C.

235 million by 1975—an increase of 55 million over the 1960 population. The number of persons under 15 is expected to increase by almost 20 million; the number over 65 by 6 million.

The National Health Survey has found that people aged 65 and over have more than twice as much illness and disability as those under 65. The also have more physician visits and more hospital care. Young children, too, receive more medical care than do adults in general.

Thirty years ago the average person saw a doctor two or three times a year; now the annual average is five visits. Since 1940 the rate of admissions to general hospitals has increased from 74 per 1,000 persons per year to 134 per 1,000. There is every indication that the factors that are bringing about the wider use of medical services, including improved economic and educational status, increasing urbanization, and extension of hospital and medical care insurance, will continue to increase the demand for medical services.

Changing patterns of medical practice will be discussed later in this chapter.

PHYSICIANS

In the United States today there are approximately 260,000 physicians. The ratio of physicians to population has risen only slightly since 1930 (table 1). We now have 7,500 graduates a year, a number that is not adequate to maintain the present physician-population ratio during the next 15 years.

TABLE 1.—Supply of physicians (doctors of medicine and doctors of osteopathy) in relation to population of the United States: selected years, 1930-61 [1, 2]

Year	Number of—	
	Physicians, M.D.	Physicians, D.O.
1930	154,600	10,300
1940	175,163	12,400
1949	201,277	12,700
1959	236,089	14,100
1961 (estimated)	246,000	14,300
	Rate per 100,000 population—	
1930	125	8
1940	133	9
1949	135	9
1959	133	8
1961 (estimated)	134	8

[1] U.S. Department of Health, Education, and Welfare, Public Health Service, *Health Manpower Source Book* (published in a number of sections). Sec. 9, Physicians, Dentists, and Professional Nurses, 1959; Sec. 10, Physicians: Age, Type of Practice, and Location, 1960; PHS Pub. No. 263, Washington, D.C.; also unpublished estimates by the Public Health Service.

[2] U.S. Department of Health, Education, and Welfare, Public Health Service, Report of the Surgeon General's Consultant Group on Medical Education, *Physicians for a Growing America*, PHS Pub. No. 709, Washington, D.C., 1959.

There has been considerable discussion of the question of the present and future adequacy of supply. It has been maintained, for example, that better organization of services will make for more efficient use of the physician's time, that more hospitalization and less home visiting enable the doctor to see more patients in a day or a week. These statements are indeed true. But in general appraisal of the picture, two major problems are often overlooked. First, the physician's workweek now averages 60 hours, with a general complaint from patients: "Doctors are too busy . . . we'd like to talk more, to tell them more; we'd like them to explain more; to listen more."[3] And, secondly, with more and more specialists, relatively fewer physicians are in private practice, especially in general practice.

A major change in medical service has been the increased employment of physicians in hospital service, teaching, research, industry, administration, and other types of institutional practice. Since 1931, while the population has increased by about two-fifths, the number of physicians in these types of service has more than tripled (table 2).

TABLE 2.—Change in type of practice of physicians (M.D.) and in total population of the United States: 1931 and 1959[1]

	Number		Percentage increase
	1931	1959	
Total population	124,149,000	176,912,000	42
Physicians:			
Total	156,406	236,089	51
In private practice	134,274	160,592	20
In hospital service, teaching or administration	12,600	47,661	278
In Federal Government service	3,551	17,519	393
Not in practice	5,981	10,317	72

[1] U.S. Department of Health, Education, and Welfare, Public Health Service. *Health Manpower Source Book* [published in a number of sections]. Sec. 10, Physicians' Age, Type of Practice, and Location, PHS Pub. No. 263, Washington, D.C., 1960.

Changes in patterns of service.—For personal health services, the civilian population of the United States now has a physician-population ratio of about 100 per 100,000 population. Is this enough, too little, or too much? The best yardstick we have is the experience of medical groups that offer comprehensive care on a prepaid basis. These groups, which attempt to meet the health needs of the members and which have the advantages of organization and auxiliary help to make the best use of the physician's time, now utilize the services of from 1 to 1.25 physicians per 1,000 persons.

These groups do not provide care to patients with long-term mental illness, and they have a lower-than-average proportion of persons past 65 years of age among their members. The experience of these groups strongly suggests that we do not have enough physicians in private practice to provide adequate services to the entire population.

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[3] Mayes, Herbert R. "What does the doctor do? Much. What does the patient want? More." *Journal of the American Medical Association*, 167: 1364-1367, July 12, 1958.

Other needs are apparent. In the past year particularly there has been much concern over hospitals' unmet needs for interns and residents, who combine obtaining educational experience with providing substantial amounts of medical service. Even the present use of some 9,500 graduates of foreign medical schools in our hospitals has failed to meet this considerable need.

Mental hospitals are notoriously understaffed—their present need is for more than 3,000 physicians.

It is estimated that over 25,000 physicians are spending all or part of their time in teaching or research. There are increasing demands for physicians to serve on medical school faculties, and the need for physicians for medical research is a critical factor in the growth of such research.

Health departments and other health agencies are seriously handicapped by their inability to secure needed physicians for their staffs.

All of these findings taken together suggest that the present ratio of physicians to population is less than adequate. And yet the present outlook is not for an improvement but for a worsening of this picture.

To maintain merely the present ratio of physicians to population would require 335,000 physicians in 1975—11,000 more than we expect to have. To reach the level of 335,000 we must by 1975 increase the number of our medical school graduates to 11,000—3,500 a year more than the present number.

Medical school facilities.—There are 86 medical schools in the United States. Of this number, 83 offer the full 4-year program; 3 are schools of the basic medical sciences, offering only the first 2 years of medical education. Most medical schools are fairly small; the average number of graduates is 100 a year, with a range of from 50 to 175.

The 6 schools of osteopathy graduate an average of 75 students a year.

To secure the capacity to allow an additional 3,500 graduations a year will require both expansion of existing schools and creation of new ones. The best judgment today seems to be that present schools might handle another 1,000 students per class, but that another 20 to 24 schools must be established.

This is a task of great magnitude. Medical schools require both a substantial physical plant and a substantial operating budget. A school with 100 students per class, with a typical program and an average-sized research program, requires a basic science building which will cost not less than $5 million, and probably considerably more.

It must have a teaching hospital of 400 to 500 beds. If it builds its own hospital (and most schools find this necessary), there will be a capital outlay of $10 to $15 million.

Operating budgets average about $2 million, with tuition providing only 17 percent of the income of private medical schools and 9 percent of the income of public ones.

Expanding the Nation's capacity for providing medical education is a slow process. After the initial steps in establishing a medical school have been taken, the graduation of the first class of students requires a minimum of 8–10 years. For this reason, long-range planning is an overriding necessity.

Length of medical school training.—The medical school curriculum requires continual reevaluation. Not only must it encompass the growing body of knowledge concerning diagnosis and treatment, but it must also give more emphasis to the preventive and rehabilitative sectors of modern medicine and to the preparation of the student for practice as a member of a health team in the community. Such demands on a curriculum that already requires a length of time greater than that of any other profession will necessitate inspired approaches to medical teaching.

Almost every student enters medical school with a bachelor's degree. After 4 years of medical school he enters a hospital for a 1-year internship and usually remains another 2 or 3 years for residency training in a specialty field.

Serious attention is now being given to the possibility of shortening this period of training and of bringing the study of the humanities and of science into some better relationship. Several schools are experimenting with some combination of the last year or two of the undergraduate program with the first 2 years of medical school. Others are looking at the relation between the last 2 years of medical school and the hospital internship and residency in an attempt to make the clinical experience both shorter and more meaningful.

And perhaps more important is the growing realization that most medical education is not directed at the basic and growing need for more family physicians—for the practitioner who does not only consider a disease entity, but is able to serve the patient as a person. Programs training physicians to attain such broad competence are rare today, and nothing is more sorely needed.

DENTISTS

Though the supply of physicians has just kept up with the population growth, the supply of dentists has shown a relative decrease. Between 1930 and 1960 the number of dentists per 100,000 population (including the Armed Forces) dropped from 59 to 56 (table 3).

TABLE 3.—Number of dentists in the United States in relation to population, selected years, 1930–60 [1]

Year	Number of dentists in the United States	Number of dentists per 100,000 population
1930	73,108	59
1940	81,686	62
1950	86,876	57
1960 (estimated)	100,000	56

[1] U.S. Department of Health, Education, and Welfare, Public Health Service. *Health Manpower Source Book* (published in a number of sections). Sec. 9, Physicians, Dentists, and Professional Nurses, 1959; Sec. 10, Physicians' Age, Type of Practice, and Location, 1960; PHS Pub. No. 263, Washington, D.C.; also unpublished estimates by the Public Health Service.

At current training rates, the number of dentists as projected will rise from 100,000 in 1960, to 118,000 in 1975—only 50 per 100,000 persons.

Many of the same factors pressing the demands for medical care are evident with respect to dental service. These include rising standards of living, greater sophistication as to the value of health services, experimentation with prepaid dental service. There is urgent demand for dental school faculty and for research workers.

Again using the maintenance of present population ratios as a minimum goal for 1975, we find a need for increasing the graduation rate of dentists from 3,200 to 6,200 a year.

Dental school facilities.—There are 47 dental schools in the United States. All of these offer a full 4-year program. Even if present schools substantially increase enrollment, another 20 dental schools are needed if we are to secure the needed 3,000 additional graduates a year.

NURSES

While the number of graduate nurses has steadily increased both absolutely and relative to population, there seems to be no diminution in the demand for more nurses. With 500,000 nurses working today, hospitals now have an estimated 20,000 vacant positions. In many nursing schools, teachers are needed. Public health nurses cannot be found to fill many existing community positions. In recent years the number of nurses graduated each year has stood at about 30,000—a number equal to about 4 percent of the 17-year-old girls in the population (table 4).

In recent years two significant changes have taken place in nursing education. First is the substantial increase in graduates receiving the bachelor's degree, more and more considered to be a requisite for supervisory and teaching positions. The other is the great increase in the training of practical or vocational nurses, much of it as part of the State vocational education programs, which receive substantial Federal support through the U.S. Office of Education. These 1-year programs are making a major contribution to meeting nursing needs. Their rapid and continuing growth stands in marked contrast to the training picture for most types of health workers.

TABLE 6.—Number of nursing-school graduates, 1952 and 1958

Type of course	1952	1958
Graduate nurses	29,016	30,410
Baccalaureate or bachelor's degree	1,988	3,671
Diploma—3-year course	26,730	26,314
Associate degree—2-year course	298	425
Practical or vocational nurses—usually 1-year course	6,000	12,407

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Nursing, Facts About Nursing, unpublished data.

But even these expanded training programs have not met existing needs. With the expectation of considerable increase in the number and use of hospital beds, with the sharp rise in the number of nursing homes, and with new emphasis on home nursing care for the chronically ill, there is every indication that we must continue to expand our capacity for the education and training of nursing personnel.

STEPS TO MEET NEEDS

To provide even for maintaining present levels of supply of health manpower in relation to population over the next 10 or 15 years will require vigorous action by the educational institutions concerned, by State and regional authorities, by voluntary groups, by the Federal Government, and by others.

At the institutional level, steps are being taken to expand existing medical schools and to establish new ones. Since 1950 seven new 4-year medical schools have been established. If the goal of the Surgeon General's Consultant Group on Medical Education—20 new medical schools by 1970—is to be reached, however, the rate of establishment over the next decade must be three times as great as it was during the previous one.

There has recently been extensive experimentation with the medical curriculum at such universities as Western Reserve, Johns Hopkins, Cornell, Stanford, Boston, Northwestern, and Wayne. Comprehensive family care clinics, interdisciplinary approaches to teaching, integration of basic medical science courses with college premedical courses—these are some of the new developments in the medical education curriculum.

An important trend in the organization of medical education is the increasing development of the medical center. A medical center is an integrated administrative complex within a university, optimally including a medical school, affiliated hospitals, and associated health education and health service programs of the community. The medical center can train physicians, dentists, nurses, public health specialists, and ancillary medical personnel with more efficiency than can its components working separately.

State action.—On the local, State, and regional levels, steps taken to expand medical education include provision of financial help by the various levels of government. The report of the Surgeon General's Consultant Group cited the variation in State outlays for medical education and showed that these outlays are not uniformly related to the fiscal capacity of the States.[8] The distribution of States by support in relation to personal income in 1957–58 was as follows:

Estimated amount of State and local governmental support of medical education per $1,000 personal income	*Number of States*
Total reporting	48
40 cents or more	8
25–39 cents	11
1–25 cents	20
None	9

Another contribution that is being made on the State and regional level is planning. Regional groups such as the Southern Regional Education Board, the Western Interstate Commission on Higher Education, and the New England Board of Higher Education have undertaken broad evaluations of training capacity in terms of the total health manpower needs of a region. These agencies have recommended establishment of needed schools and suggested general geographic locations for them. They have also served as channels for the interstate flow of funds for the support of medical education.

Voluntary support.—Support from voluntary sources has been substantial. In 1957–58 the American Medical Education Foundation for the National Fund Medical Education, the Commonwealth Fund, the Ford Foundation, and various other organizations, as well as individuals, contributed an estimated $33 million to medical schools in gifts, grants, and endowments. But contributions from nongovernmental sources, even if greatly increased, will not sufficiently finance the needed expansion of medical education.

Increasing the supply of medical and dental students.—If the capacity of medical and dental schools is to be expanded, will there be enough qualified applicants to fill the places? Many schools are reporting that they are hard pressed to find enough acceptable students today. That the average quality of medical school students has declined is suggested by the fact that the percentage of first-year students failing or withdrawing in academic difficulty is almost half again as high now as it was in the early 1950's.[8]

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[8] U.S. Department of Health, Education, and Welfare, Public Health Service, Report of the Surgeon General's Consultant Group on Medical Education, *Physicians for a Growing America*, PHS Pub. No. 709, Washington, D.C., 1959.

Medicine and dentistry are professions that offer substantial prestige and a high income level. But they have become professions which few persons can afford to enter unless they come from families with relatively high incomes, or have wives who can work to provide substantial financial assistance. Forty percent of medical students come from families with annual incomes that exceed $10,000. Even with their parents' support and their wives' incomes, 40 percent of married medical students owe over $5,000 at graduation and 17 percent, over $10,000.[9]

After he finishes his undergraduate education, the medical or dental student looks forward to another 4 years, which will cost on the average more than $10,000. And for the medical student there will be an additional 3 or 4 years of hospital training in which his income will be less than his expenditures.

Although substantial fellowships amounting to $2,000 a year or more are available to many graduate students in other fields of biological and physical science, little such aid is available to medical and dental students. In the last 10 years the number of Ph. D.'s in the physical and biological sciences, in which scholarship aid has been more plentiful, has increased at a much faster rater than has the number of medical graduates. (See chart.) It is apparent that such aid is essential if medicine and dentistry are to secure the needed recruits.

Federal aid.—On the Federal level several agencies now provide educational and training opportunities for health manpower. The Public Health Service, the Office of Education, the Office of Vocational Rehabilitation, and the Armed Forces have programs through which many students are educated at some stage of their health service careers. The National Defense Education Act student loan program provides much-needed financial assistance to many students.

To increase the output of physicians and dentists, additional Federal aid has been recommended for the construction of medical and dental education facilities, and for scholarships to medical and dental students. Federal aid may be necessary also for expansion of educational opportunities in other health occupations.

Legislative proposals now before the Congress would provide matching funds for (1) the construction and expansion of facilities

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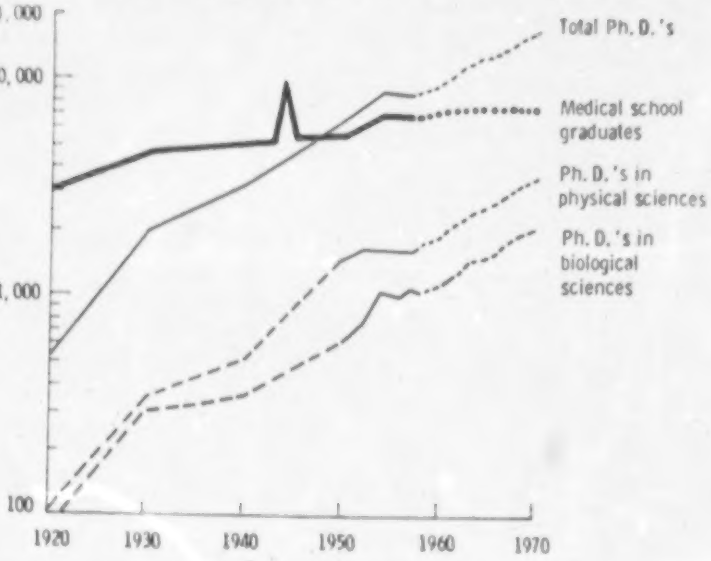
[8] Ibid.

[9] Association of American Medical Colleges, study of financial problems of medical students, May 1959. Unpublished.

MEDICAL GRADUATES AND PH D.'s: 1920–58 AND ESTIMATES TO 1970[1]



Note: Plotted on logarithmic scale to show rate of growth.

for schools of medicine, osteopathy, public health, and dentistry; (2) scholarship aid for students in schools of medicine, osteopathy, and dentistry; and (3) limited educational grants to the schools.

No comprehensive study has been made of needs for Federal assistance for the training of graduate nurses. In May 1961 the Surgeon General appointed a consultant group, similar to that on medical education, to advise him of needs in this area.

For practical nursing, a very effective program of Federal aid is now in operation. Federal funds for this program amount to $5 million a year.

SUMMARY

The national need for an increased production of health personnel, particularly in the key professions of medicine, dentistry, and nursing, is being increasingly recognized.

Today a great deal of attention is being given to exploring ways to meet the need, including planning for new and expanded schools in the health fields, for curriculum experimentation, for student recruitment, and for both private and public financial assistance to the schools.

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[1] From *Physicians for a Growing America.* U.S. Department of Health, Education, and Welfare, Public Health Service Report of the Surgeon General's Consultant Group on Medical Education, PHS Pub. No. 709, Washington, D.C., October 1959. p. 17.

Two of the major problems faced by the universities that are considering expanding or establishing schools of medicine and dentistry are: (1) meeting the great cost of providing the requisite facilities, and (2) attracting enough well-qualified students. Legislative proposals before the current Congress aim to solve these problems. Such legislation would do much to stimulate and assist educational institutions in their efforts to respond to the Nation's need.

CHAPTER 5

National Requirements for Scientists and Engineers: A Second Illustration

Thomas J. Mills[*]

OUR DEFINITIONS of the professions of scientist and engineer are not precise. Frequently we find the scientist engaged in the applied work one traditionally associates with the engineer. Conversely, growing numbers of engineers are found in scientific research laboratories where their skills are in demand both for science applications and for basic research in many scientific fields. More complexity and further definitional problems are added when one attempts to trace growth over time.

Rather than attempt to refine our definitions so that they might become more precise instruments (comparable data would not be available in any event), it is convenient to consider these professions as consisting of rather broad spectra. The profession of scientist is broadly concerned with the further development and extension of the subject matter of science. The engineer is more likely to be engaged in the application of known scientific principles to practical economic problems. In each profession will be found some persons who in terms of training, interests, and kind of work performed are closer to persons in the other profession than to those in their own. All of this is to say that the professions are closely akin, and satisfactory criteria for classification are few. At the fringes of these groups are technicians in science and engineering, whose knowledge of scientific principles is generally more limited.

GROWTH OF THE SCIENTIFIC AND ENGINEERING PROFESSIONS

Bearing in mind that precise definitions of "scientist" and "engineer" are not available, I am presenting here estimates of the general magnitude of growth in the United States of the professions of scientist and engineer.

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[*] Program Director for Scientific Manpower, National Science Foundation.

TABLE 1.—Number of scientists and engineers, United States, 1900–59

(In thousands)

Year	Total	Scientists ¹	Engineers ²
1900	45	4	41
1910	92	8	84
1920	149	19	130
1930	261	46	215
1940	378	92	286
1950	734	200	534
1959	1,110	310	800

[1] These estimates are developed from several sources, including the "Steelman Report," *Manpower for Research*, vol. 4 of *Science and Public Policy*, by John R. Steelman, Washington, Government Printing Office, 1947, and the American Council on Education report, *The Production of Doctorates in the Sciences: 1936–1948*, Washington, 1951.

[2] Data for 1900–50 from the Bureau of the Census, *Decennial Census of Population*, data for 1959 from the National Science Foundation.

From these data it will be seen that from 1900 to 1959 the number of scientists is estimated to have increased 75 times, and the number of engineers 20 times. For scientists, this is equivalent to an increase of more than 7 percent compounded annually since 1900; for engineers, an increase of more than 6 percent. During that period the number of all professional, technical, and kindred workers increased about six times, while the total population of the United States was increasing less than 2.5 times. As tenuous as our statistical data are, especially for the earlier years, the conclusion seems clear. The rates of growth of these professions are so large that even a very considerable margin of error would have little effect on the relative picture.

WORK ACTIVITIES OF SCIENTISTS AND ENGINEERS

It is well known that scientists are principally engaged in research and development, production operations, or college and university teaching. Relatively smaller numbers are employed as managers, writers, and consultants. Engineers are most likely to be employed in production operations, although large numbers are engaged in research and development and in management. Table 2 shows estimated percentage distributions of scientists and engineers by type of work.

TABLE 2.—Work activities of scientists and engineers in the United States, 1960, percentage distribution, by type of work

Type of occupation	*Percentage distribution of—*	
	Scientists	*Engineers*
Total	100	100
Production	23	40
Research and development	43	30
Teaching	20	2
Management and administration	5	8
All other	9	20

SOURCE: National Science Foundation estimates, developed from numerous Foundation-sponsored surveys of industry, colleges and universities, and Government, and from the Foundation's National Register of Scientific and Technical Personnel.

EMPLOYMENT PATTERNS OF SCIENTISTS AND ENGINEERS

The types of employers of scientists and engineers reflect the locations in which their work is done. With the growing emphasis on research and development in industry, business establishments now employ more scientists than do either governmental or educational institutions. The greatest number of engineers have traditionally worked in private industry. In 1960, 83 percent worked in industry. Educational institutions, principally colleges and universities, are the second largest employers of scientists, and Government is next. This relationship is reversed for engineers, who are employed in larger numbers by the several levels of Government than by educational institutions. Only 2 percent of engineers are employed in educational institutions.

Estimated percentage distribution of scientists and engineers, by type of employer, appear in table 3. *Percentages given are approximate only and should not be considered precise values.*

TABLE 3.—Employment of scientists and engineers in the United States, 1960, percentage distribution by type of employer

Type of employer	*Percentage distribution of—*	
	Scientists	*Engineers*
Total	100	100
Industry	50	83
Educational institutions	25	2
Government	20	14
All other	5	1

SOURCE: National Science Foundation estimates, developed from numerous Foundation-sponsored surveys of industry, colleges and universities, and Government, and from the Foundation's National Register of Scientific and Technical Personnel.

FORMAL EDUCATION OF SCIENTISTS AND ENGINEERS

As is true of other professions, formal higher education constitutes the main part of the preparation of scientists and engineers. There are still considerable numbers in these professions without the conventional baccalaureate—particularly in engineering—but these are becoming the exception. To a large extent these numbers may reflect the fuzziness of the definitions of scientist and engineer rather than constituting a subgroup of these professions. It is agreed in any event that professional workers without any formal higher education in these fields are relatively few and the number will grow progressively smaller as higher levels of training are sought and demanded for professional recognition.

Graduate study is increasingly required in these professions. Persons with graduate degrees in science, which are traditionally associated with *college and university teaching, are found in increasing* numbers in industry and Government. In some fields of science a doctorate is becoming a requirement for full professional recognition. Data reported to the National Register of Scientific and Technical Personnel show that about 40 percent of the scientists registered in it hold a doctorate, and another 25 percent a master's degree. Scientists included in the Register are, however, more likely to be engaged in research or college teaching, fields traditionally associated with graduate degrees.

The baccalaureate is more likely to represent the highest degree held by engineers than it is by scientists. But in engineering too, more emphasis is being placed on graduate study. More graduate students are now enrolled in engineering than in any of the basic science fields, and the number of doctorates conferred each year in engineering is now exceeded among the science fields only by the number conferred in chemistry. At the present time probably no more than 1 to 2 percent of the engineers hold doctorates; another 7 percent or more have a master's degree. For about 67 percent of the engineers the baccalaureate is the highest degree held.

Table 4 gives estimated percentage distribution of the highest degrees held by scientists and by engineers. Each level is a broad spectrum that includes not only scientists and engineers who have completed the minimum qualifications for that level but also those who have progressed almost to the next level. It is noteworthy that more than two-thirds of the engineers without degrees are estimated to have completed 1 to 3 years of college.

TABLE 4.—Education of scientists and engineers in the United States, 1960, percentage distribution by highest degree held

Highest degree held	*Percentage distribution of—* *Scientists*	 *Engineers*
Total	100	100
Doctorate	25	1
Master's degree	35	7
Baccalaureate	35	67
No degree	5	25

Source: National Science Foundation estimates, developed from numerous Foundation-sponsored surveys of industry, colleges and universities, and Government, and from the Foundation's National Register of Scientific and Technical Personnel.

FUTURE DEMAND FOR SCIENTISTS AND ENGINEERS

Estimating future demand for any occupation with an acceptable amount of precision is far from an exact science. Various methods have been developed to project future demand (or need) for professionally trained manpower in order to arrive at the kinds of data required to establish sound personnel policies and reach necessary decisions on educational facilities. Among these methods are the following:

Projection of occupation-population ratios.—For some occupations demand estimates are prepared by assuming a desirable ratio between the number of persons in a profession and in the total population. The ratio may be such as to maintain the current relationship. Or the ratio may be arbitrarily placed above or below these current ratios, after account is taken of developments in the utilization of and the need for these professional services. Given the population projection and the ratio, the occupational estimate is readily derived.

Summation of job opportunities.—Sometimes estimates are made of the demand for workers by summing up information solicited from large employing groups reporting present job opportunities—those filled as well as those unfilled—and employer expectations regarding opportunities for employment in a period ahead. The effect of this method is to diffuse the responsibility for an estimate among employers, who are believed to have information on which to base a valid judgment. To provide a reasonable guide to estimation, the definitions of job opportunities need to be carefully standardized and consistent assumptions followed.

Projection of occupational trends.—The historical growth rates associated with an occupational category are sometimes projected on the assumption that the underlying economic and social factors responsible for the observed historical trend will operate more or less in the same way in future years.

Projection of occupational developments and economic growth.—A number of estimates of future requirements have been made that establish with few or many variables the complex relationships that existed in the past between the occupation and other economic or social phenomena. One fairly simple relationship often applied is that between growth trends in an occupational category and changes in the gross national product. An industry-by-industry examination of the numbers required in an occupational category for a given change in value of production is illustrative of a more complex method of projection.

Projection of needs based on criteria of desirable levels of professional services.—Estimates of needs for professional services and of manpower to provide these services have at times been formulated. These estimates do not attempt to define the magnitude of the market demand for an occupational group, or of employment prospects directly; rather they set out to define what the number of persons in an occupation "ought" to be in order to meet certain desired objectives, as, for example, in scientific research, faculty staffing, or direct provision of professional services to individuals and to industry.

Analysis of the demand. Although we are a long way from the development of adequate tools for accurate projection of market demand for persons with specific types of professional education at current or even projected salary levels, historical relationships between output and occupational demand can be used to yield an approximation of such demands. Moreover, detailed analysis of labor market requirements helps to demonstrate the nature of problems emerging even if it does not yield a precise set of numbers of persons required in each occupational category. For one thing, such analysis serves to emphasize, at least in the case of scientists and engineers, the importance of the Federal Government in the demand-supply equation. Currently the Federal Government provides about 60 percent of the more than $13 billion expended each year on scientific research and development, one of the principal activities in which scientists and engineers are engaged. Additional scientists and engineers in large numbers are employed in the production of military hardware items or in the administration of Federal science programs. Federal activities thus account either directly or indirectly for a large, although unknown, proportion of the employment of all scientists and engineers.

The Federal Government plays a far less important role in the training of scientists and engineers. Although there is little Federal financial support of elementary and secondary school education, the Federal Government indirectly is a strong influence for science education. At the college and university level, increasing amounts of Federal funds are providing support for students, faculty, and facilities. Federal funds are especially important in the graduate schools, where large amounts are devoted to providing fellowships, research and instructional equipment, and research assistantships, principally in the science and engineering disciplines.

Whatever methods are used, projection of demand for scientists and engineers displays unique problems. These rapidly expanding professions are outgrowing many past relationships. Data permitting the measurement of these relationships are scanty and time series information is even more limited. Lack of precision in the occupational definitions again poses a problem. These limitations upon the estimating process are stated here not to discourage projection, but to suggest that any estimate derived should be regarded as a point within a range, rather than an exact statistic.

It has been shown earlier in this chapter that the number of scientists has been increasing by over 7 percent compounded annually since 1900, and the number of engineers by more than 6 percent. If these rates continue through 1970, there will be an indicated requirement for about twice as many scientists and engineers as were employed in 1959. (This estimate assumes that the number employed in the past has been equivalent to the number required.)

Growth of demand at about this magnitude is indicated by a Bureau of Labor Statistics study prepared for the National Science Foundation, and published in 1961. This study, entitled "The Long Range Demand for Scientific and Technical Personnel, a Methodological Study," extrapolated employment to 1970 on the basis of the past ratios of scientists and engineers to total employment, industry by industry. The findings were then reviewed and adjusted in the light of recent developments suggesting some modifications of patterns of employment. The final estimates show about a 90-percent increase in the number of scientists and engineers needed over 1959 levels, for a total of a little more than 2 million by 1970.

As crude as these projections may be, they appear reasonable. They are in line with trends over the past 60 years, when relatively little public attention was paid to science and engineering. Within the past decade science has generally been identified as important to economic growth and military security, and we may expect that this emphasis will continue for the next decade, in view of the state of the cold war. It may be persuasively argued that the projections are more likely to be low than high in the light of our national undertakings. For the purposes of this discussion we will use the Bureau of Labor Statistics estimates—550,000 scientists and 1,485,000 engineers—as an approximation of requirements by 1970.

IMPLICATIONS FOR HIGHER EDUCATION

Our national labor force contains no unutilized reservoir of trained manpower adequate to meet national requirements of the magnitude noted above. The requirements will have to be met through training large additional numbers. In view of the educational qualifications required for acceptance in these professional groups at present—college and often graduate education—the burden of training adequate numbers falls largely upon the Nation's colleges and universities. Thus, the need for scientists and engineers becomes translated into a requirement for the higher education necessary to produce them.

The colleges and universities at first glance would appear to be in a position to provide this training. Total enrollments in colleges and universities are expected to rise from 3.6 million in 1960 to prehaps 7.0 million by 1970.[1] For a somewhat smaller enrollment, the number of earned degrees in 1969–70 has been estimated to include a little over 700,000 bachelor and first professional degrees and about 18,000 doctorates.

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[1] See Louis H. Conger, Jr., ch. 1 of this publication.

A second look raises some doubts as to whether higher education will achieve this task. The overall estimate of expanded college enrollments represents actually the number of qualified students wishing to enroll, provided colleges can admit them. ("Qualified" is meant in the sense that this group represents students of approximately the same levels of ability as the students colleges have admitted in recent years.) In question is the ability of the colleges to absorb an average of 500,000 more undergraduates each year for 10 years—an annual increase of almost 10 percent of present enrollments. Will additional faculty and facilities be available to provide higher education to so many without sacrificing quality?

Even assuming that an enrollment of this magnitude can be accommodated, it is not certain that scientists and engineers will be produced in the volume required. A requirement of 1,185,000 engineers by 1970 implies an increase in engineering baccalaureates from the 38,000 engineering degrees granted in 1960 to an average of about 80,000 a year over the next 10 years, when both additional requirements and replacements for death and retirement are taken into account. The decline in freshman engineering enrollments since 1957 has already fixed the number of engineer baccalaureates at fewer than 40,000 per year through at least 1964. At this rate engineering baccalaureates will have to average more than 100,000 per year for the 6-year period 1965–70 to meet the estimated requirement. This seems impossible.

Even the assumption that a quarter of the new engineers will enter the profession without a degree does not make it a simple matter to meet the estimated requirements. Under this assumption more than 70,000 new baccalaureate engineers would be required on the average during the years 1965–70, in view of the smaller 1961–64 classes.

Requirements for scientists present a similar problem. The 550,000 scientists required by 1970 implies an annual average of more than 30,000 new scientists trained per year over the next 10 years when allowance is made for replacement of normal attrition. If no more than 25 percent of them are doctorate holders (the present percentage), doctorates in science should average about 7,500 granted per year over the next 10 years. Currently fewer than 6,000 doctorates a year are granted in all sciences and engineering combined. According to present trends, science doctorates conferred should reach about 10,000 per year by the end of the decade. It would appear that the present proportion of scientists with the doctorate can be maintained and might be increased slightly. A substantial enlargement of the proportion of scientists with doctorates does not appear likely, however.

MEETING THE REQUIREMENTS

Although analysis of the projected requirements, in engineering particularly, suggests that these requirements cannot be met by the output of higher education, the jobs will not remain vacant. The vacancies of one year cannot be realistically added to those of the next year to arrive at a cumulative number of vacancies. Personnel will be found to fill most of the positions; unfortunately, the workers will be less broadly trained than is desirable. (Some of them, of course, will be baccalaureates in fields other than that usually associated with their positions. For example, science baccalaureates will be found in engineering jobs.) Generally, the effect may well be to substitute more narrow, on the job oriented training for the broader education associated with institutions of higher education. The scope of this chapter does not extend to comparing the relative merits of the broad and the narrow systems, but for the training of professionals it is usually believed the systems should be complementary rather than competitive or exclusive.

Educators have set forth the dimensions of the problems facing higher education in future years. The tasks and the challenge are herculean. Additional resources are needed to expand college and university facilities and to recruit and retain the teaching staffs required under present standards. Even greater resources are required to elevate the quality of education so that the responsibilities of the colleges and universities for training scientists and engineers may be met.

To use most effectively and efficiently the resources that are allocated for higher education, there must be more widespread application of some of the methods that are now applied in only a limited or experimental way.

More nearly complete utilization of educational plant through lengthening both the school day and the school year gives promise of training larger numbers in a shorter time. Continued attention to techniques for selecting students and more attention to retaining them would be especially valuable if together they reduced the 40–50-percent rate of loss in undergraduate study. Utilization of faculty is a topic always approached with trepidation. Yet it is the single most important one from the standpoint of quality of training. The tools that extend faculty teaching skills, such as the various forms of visual aids; the recognition of instruction as the primary mission of higher education; and attention to teaching loads are among the areas where progress frequently can be made with limited resources. Finally a mechanism by which the student body can be apprised of the opportunities and challenges of the different professions would do much to bring the supply more nearly in line with prospective requirements.

Part II

HIGHER EDUCATION AS AN INVESTMENT IN PEOPLE

CHAPTER 6

Human Capital: Concepts and Measures

Mary Jean Bowman[*]

I. Prefatory Remarks

THE PAST FEW YEARS have seen a rising interest in viewing education as an investment and in attempts to assess the role of education in economic productivity and economic growth. There are of course many approaches to this set of problems. One can look in detail at the particular kinds of education possessed by certain groups of people in order to ascertain how this education affects their subsequent productive roles, at the same time comparing these results with the associated costs. At the other extreme, one may take a global approach that attempts to assess the aggregative costs of education and the aggregative impacts of education on the economy. Aggregative analysis may be viewed as providing a picture of the wide setting within which the more detailed studies take their place. Between these extremes there are of course many possible variations, just as there are also variations within the detailed and the global approaches.

This chapter was written for professional economists, but it is nonetheless relevant for those who make educational policy. It is concerned with the theory and measurement of "human capital," which are basic to any attempt at assessment of aggregative aspects of investment in education. There are a number of different concepts of capital, and throughout this paper the importance of choosing concepts and measures appropriate to the particular problem is stressed. In most of the discussion "human capital" is defined as one or another variant of education "embodied" in the labor force.

Analysis of human-capital concepts and measures is necessary as a basis for proceeding to consideration of four important questions:

1. What have been the total human-capital inputs into the productive system, and how have these affected national outputs, that is, gross national product, over a period of time?

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[*] Research associate professor in economics, University of Chicago. This article was first published as a contribution to the *Festkrift for Professor Johan Akerman, entitled Money Growth, and Methodology*, C. W. K. Gleerup, Lund, Sweden, March 1961. It [illegible] reproduced here with only minor changes except for the addition of the prefatory remarks directed to readers who may be specialists in education rather than in economics.

2. How large a part of society's productive resources has been put into formation of human capital over the past, and how has this compared with what has gone into investment in physical capital?

3. What rates of return have been realized from investments in human capital (in college education, high-school education, and so forth)? For example, $12,000 invested in a college education will add some (empirically observed) amount to average earnings during a man's lifetime over and above what he would earn if he terminated his education with completion of high school. Taking into account the time pattern of these additions to his annual earnings, what rate of interest on the $12,000 investment is implied? The $12,000, merely assumed here, is the human-capital measure needed as the base to which the additions to the earnings stream are then related.

4. Looking ahead, how may past, present, and prospective aggregate investments in formation of human capital be expected to affect the stream of national product in the future? Putting this in another way, one asks first what is the productive potential embodied in the human capital stock, how is this distributed among the various age cohorts, and how is it changing through time? How will these facts be reflected in the size of the contribution human capital will make to gross national product and in changes in the magnitude of that contribution over coming decades? Questions of this kind are especially important in situations that are rapidly changing. For example, the fact that a large percentage of the educated populations of newly developing countries are young makes a big difference. By contrast, a very different situation has arisen in Israel, where the new immigrants have educational backgrounds far inferior to those of earlier settlers and where the most highly educated people are disproportionately in the older age categories.

The concepts and measures of human capital that are appropriate in analyzing these various problems differ considerably. Two primary distinctions are important (variations of detail aside).

First and most important is the distinction between capital viewed as a *store* and capital as a current *input* into production. As a store, capital is something from which a stream of future yields can flow, and its value depends on both the size of this flow per year and the period over which the flow will persist. For example, a new college graduate with a prospective 45-year earning life ahead of him is more capital, as a store, than the 50-year-old college graduate whose future lifetime income will be less. On the other hand, looking at the education embodied in these men in terms of its contribution to production in 1961, that is, as a capital input, there is no such difference in their capital values. (For the moment, both the differences in the quality of education received by the younger and the older man and the effects of longer experience on the earning power of the older man are ignored; such problems will be considered later.) The "effective current stock" concept introduced in this paper is a measure of capital as an input. Some such measure is the appropriate concept, and indeed the only appropriate concept, for analysis of the first of the four basic questions posed above. This is true whether physical or human capital is involved, even though empirical measures of physical as well as of human capital as inputs have heretofore been lacking. On the other hand, questions 2 and 3 call for a concept and measure of human capital as a *store*. Question 4 requires use of both a store and a projected *input* measure.

Second, there are the distinctions in methods of weighting. A year of elementary schooling is not economically the same as a year in college; adding these together to get an estimate of aggregate human capital requires some weighting system that will give greater importance to the college year than to the elementary school year. But there are two quite different points of view from which the relative importance of the elementary school year and the college year may be assessed. One of these is a comparison of their respective costs. The other is a comparison of their respective values in what they may contribute to the productive potential of the individual. In either case some unchanging system of weights is needed for most purposes. For example, costs as of a particular year or earning increments associated with education at a particular time (say 1950) may provide the weights. These are "base year" weights. The distinction between base year cost and base year yield weightings is often an important one. Cost weighting focuses on the resources used in forming human capital and is clearly the appropriate type of human-capital concept for use in dealing with questions 2 and 3. On the other hand, weighting in terms of base year yields attributes to each component in education an importance commensurate with its productivity potential as of the base year. (An educational administrator in my course in economics of education suggested that this might be called measurements in "ED's.") Both base year cost and base year yield weightings of capital as an input have a legitimate place in attacking question 1, but the use of the one or the other implies a difference in the nature of the question itself. A base year yield weighting is appropriate to question 4, provided an assumption that this weighting will have continuing validity is legitimate. However, empirical estimations appropriate to question 4 involve problems of quite a different order from those that arise in connection with the first three questions, and adequate treatment would require another long paper.

II. The Treatment of Quantity and Quality in Measuring a "Unit" of Human Capital

An implicit elementary concept of human capital has long been at hand in economic writings, primarily in the context of analysis of economic growth. Subsistence fund theories that regarded mass consumption as the fueling and maintenance of the human machine are clear examples.[1] However, until recently human capital has been measured only as an undifferentiated number of men. In fact, anything verging on explicit treatment of human beings as capital was for a long time in disrepute.[2]

Meanwhile, the basis has been laid for an explicit concept of human capital that attributes different quantities of this capital to individuals with different productive capacities. Attacking Marshall's narrower concept of capital, which excluded human capital by definition, Fisher presented an all-inclusive theoretical analysis in which capital was *any* stock, physical or human. Then came a host of studies of national income or product and physical capital formation, of productivity per worker or per man-hour, and of physical capital-output ratios. The inadequacy of physical capital and employment or man-hour series in explaining growth in the national income has directed attention increasingly to an undefined "third factor" that explains the rise in outputs relative to inputs. Recently there have been some attempts to give this third factor a more respectable status, whatever it may be called. The popular label seems to be *t*, interpreted as "technological change" in so broad a sense as to include the growth and spread of knowledge and know-how in the population by whatever processes.[3] In fact, *t* includes changes of all kinds in the capital stock embodied in men, physical and "mental," and also changes in the efficiency of physical capital and economic organization and structure.[4] Picking up this theme. Schultz has attempted to isolate and measure in cost terms one major component of this change in human capital—the education embodied in persons in the labor force.[5]

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[1] In this connection, see Mary Jean Bowman, The Consumer in the History of Economic Doctrine, *American Economic Review*, 41: 1–18, May 1951.

[2] During the interwar decades there were sporadic treatments of the concept of human capital, but these were not integrated into any major stream of economic thought and were therefore relatively abortive. Examples are: J. R. Walsh, Capital Concept Applied to Man, *Quarterly Journal of Economics*, 49: 255–285; February 1935; and Louis I. Dublin and Alfred J. Lotka, *The Money Value of a Man*, New York, Ronald Press, 1930.

[3] Examples are work by Aukrust and Bjerke in Norway and by Solow in the United States. See O. Aukrust *and* Juul Bjerke "Real Capital in Norway" in *Income and Wealth, Series VIII*, International Association for Research in Income and Wealth, London, Bowes & Bowes Publishers, 1959, p. 80; and Robert M. Solow, Technical Change and the Aggregate Production Function, *Review of Economics and Statistics*, 39: 312–320, August 1957. *See also* Chapter 7 in Edward F. Denison, *The Sources of Economic Growth in the United States*, Committee for Economic Development, Supplementary Paper No. 13, January 1962.

[4] Over the past decade authors of the income and wealth studies sponsored by the National Bureau of Economic Research have made recurrent references to the need for examination of investments in the human factor, though none of them has yet published anything on measurement of human capital formation. Most if not all of the recent efforts to measure effects of education on economic growth in the United States have been either made by Prof. Theodore W. Schultz of the University of Chicago or stimulated by him.

Writers on physical capital have pointed out that in a dynamic world, cost and yield perspectives are quite different both conceptually and in measurement results. Also, appropriate concepts and measures will differ according to whether concern is with (1) assessing capital formation as part of national product—a *result*—or (2) productivity studies that use capital measures as indicators of resource inputs—a *cause*. In the latter context the usual concepts of capital stock and new capital formation (cost or yield weighting aside) are not the most suitable ones; instead, a measure of a type I am terming "effective current stock" is wanted. Thus, measurement of changes in stock involves three general concepts within each of which there may be a further variety of concepts and measures: gross capital formation, net capital formation, and changes in effective current stock.

One of the major problems, which has been widely discussed in connection with gross physical capital formation, is the treatment of quality versus quantity. However, a quantity focus does not mean that education or physical capacities embodied in human capital must be relegated to the "quality" sphere, leaving measures of human capital in their old undifferentiated form of population or labor-force counts. Let us consider for the moment education only, treating education embodied in human beings as synonymous with human capital merely to avoid awkward terminology. A measure of education embodied in persons in the labor force can be used to convert this particular quality into a quantity, still leaving changes in the productivity of a unit of education in the quality category. The educational component of human capital then becomes a specific independent variable, comparable with physical capital and labor-force measures in analysis of economic growth.

Conceptually, units of human capital defined in the limited sense of "education embodied in the labor force" may be measured in a number of ways, all but one of which have at least approximate counterparts in the identification and measurement of units of physical capital. These units are:

A. Number of school years (with or without adjustments to school-year equivalents in terms of numbers of days of schooling per year).[6]

B. Efficiency equivalence units.

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[5] For details, see Theodore W. Schultz, "Education and Economic Growth" in National Society for the Study of Education, Nelson B. Henry, Ed., Part 2, *Social Forces Influencing American Education, 1961*, University of Chicago Press, 1961, p. 46–88.

[6] The first aggregation of school years to my knowledge was discussed in C. Arnold Anderson and Mary Jean Bowman, "Educational Distributions and Attainment Norms," in *International Population Congress*, Rome, 1954, sec. 27. However, the focus of that paper was on distribution of schooling and identification of the location and importance of intermediate completion norms. The aggregates were not used to measure human capital as such.

C. Base year lifetime earned incomes.
D. Approximations to base year real costs.
    1. Real costs as consumption foregone.
    2. Real costs as inputs of labor effort (or time) and savings.
E. Approximations to current real costs.

A. NUMBER OF SCHOOL YEARS

A simple aggregate of school years or school days embodied in the labor force provides a proximate measure of total human capital that has no counterpart with respect to total physical capital, the components of which can be added only through some kind of money valuation. However, this would give the same weight to a year (or a day) in college as to one in elementary school. Hence, some system of weighting may be desirable. In any case, only when cost or yield value weights are used does the measure of human capital become comparable to measures of physical capital.

B. EFFICIENCY-EQUIVALENCE UNITS

Measures in "efficiency-equivalence" units (not to be confused with base-year yield weightings) incorporate productivity changes in the measurement unit. In the case of education this would involve weighting years of schooling obtained at different times (or in different schools) in terms of their productive contributions. For example, if the high school education of 1960 turns out students whose lifetime productive capacities exceed those of the 1940 graduates by, say, 20 percent (after adjustments for effects of postschool experience), the education embodied in a 1960 graduate would have a weight 1.20 times that embodied in a 1940 graduate; in efficiency the 1960 graduate is the "equivalent" of 1.20 graduates of 1940. Such a weighting would be analogous to measures of physical capital in which new capital goods are valued in terms of their base-year productivity equivalents; this is the same as weighting by base-year costs of turning out capital of equivalent productivity, provided base year ratios of cost to productivity for various kinds of capital are equal (that is, capital markets are in equilibrium). If the purpose of measurement is assessment of changes in productive capacity, such an approach is appropriate; changes in the quality of schooling have been incorporated in the measure. However, if it is productivity relative to ultimate inputs that is of interest, efficiency-equivalence units are clearly inappropriate.

C. BASE-YEAR LIFETIME EARNED INCOMES

Measurement in terms of base-year lifetime earned incomes does not build changes in productivity or quality into the definition of a unit of capital. Such a measure is very different from the productivity weighting involved in efficiency-equivalence units. In the case of physical capital, base year market price approximates capitalized lifetime yield, which tends to be equated also with production costs. Thus, to the extent to which competitive equilibria are approximated, the distinction between base year capitalized income and base year cost measures of physical capital (see D below) tends to disappear. This is not the situation in the case of human capital, which is not sold as capital and has no market price. Taking a market view of the value of new human capital requires explicit (not merely implicit) estimation of the value of lifetime earnings. If the concept is confined to the educational component, this becomes the value of the increments to lifetime earnings attributable to education. But market forces do not equate costs of new human capital and its capitalized expected income to the degree to which this occurs in the case of physical capital. Regardless of the interest rate used, if any, in discounting, empirical evidence shows that these yields vary by levels of schooling.[7]

If a broader concept of human capital is wanted, one that includes noneducational components, measurement in base year lifetime earned income units is the most convenient and probably the only feasible approach. A classification of human capital by education categories would in this case include people with no education, a group excluded when human capital is narrowly defined as educational capital only. When human capital is defined broadly, classification by education is of course only one of many possible ways of disaggregating the total into components with distinctive income characteristics, but it is one of the most useful.[8]

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[7] For a discussion of stabilities and instabilities in lifetime income differentials by education level in the United States since 1939, see Herman P. Miller, Annual and Lifetime Income in Relation to Education: 1937-1959, *American Economic Review*, 50: 962-986, December 1960. Analyses of lifetime incomes according to education, as evidenced in 1950 census data, are presented in Paul C. Glick *and* Herman P. Miller, Educational Level and Potential Income, *American Sociological Review*, 21: 307-312, June 1956; and in H. S. Houthakker, Education and Income, *Review of Economics and Statistics*, 41: 24-28, February 1959. Houthakker estimates capitalized values of both pretax and posttax incomes at age 14, without discounting, and using several discount rates. Under the auspices of the National Bureau of Economic Research, Gary S. Becker is currently completing an intensive study of rates of return from education. A brief report of some preliminary findings appeared in his article, Underinvestment in College Education? *American Economic Review*, 50: 346-354, May 1960. An earlier study by Milton Friedman *and* Simon Kuznets sets forth the basic methodology (*Income From Independent Professional Practice*, New York, National Bureau of Economic Research, Publication No. 45, 1945).

[8] Though he did not identify his series as a measure of "human capital," Kendrick's weighting of man hours in each industry by average base year hourly wages in that industry involves an adjustment of the human factor input measures that would be similar to a base-year income measurement of human capital if higher wage industries employed higher quality labor. However, high hourly wages are often associated with irregular and seasonal employment (as in the building trades), or dangerous and disagreeable working condition (as in mining). A breakdown by industry has no very direct relation to human-capital formation as such. Using education instead of industry categories focuses on the significance of changes in the human factor itself rather than the locus of its employment. *See* John W. Kendrick, *Productivity Trends: Capital and Labor*, New York, National Bureau of Economic Research, Occasional Paper 53, 1956, and his *Productivity Trends in the United States*, Princeton University Press, 1961.

Choice of discount rate in measurement by base-year lifetime earned income is an arbitrary matter, and there is much to be said for simply aggregating lifetime earnings without discounting.[9] However, this does not imply merely adding up average incomes at each age as they appear in census tabulations of incomes by age and education. The desired lifetime figure is expected total lifetime earnings, and these are affected by mortality and other withdrawals from the labor force. The same procedures that provide capital-consumption estimates in the measurement of net capital formation provide the basis for base-year lifetime-income estimates of gross capital formation.

D. APPROXIMATIONS TO BASE-YEAR REAL COSTS

Regardless of whether future earned incomes are discounted or not, any valuation of human capital in base-year lifetime income units may be regarded as an expression of quality differences in quantitative terms; however, prior and subsequent changes in quality within an education (or other) category are excluded. Cost valuation of the educational stock embodied in the labor force goes further than this in the quantitative direction. Basically it goes back of the educational components to measure the resources that produce them. Even base-year differences in quality or productivity from one education category to another are excluded to the extent that they deviate from cost differences. This is a step toward measurement in base-year "real cost" terms. But the concept of real costs has more than one meaning. Subjective real costs may be defined either as consumer satisfactions forgone or as disutilities of labor and of waiting. The objective counterpart of the former is consumer goods and services forgone. The objective counterpart of the latter is labor time involved in production plus interest viewed as a payment for waiting.

At this point it is useful to compare Denison's approach to the measurement of gross physical-capital formation with approximations of human-capital formation through investment in education.

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[9] Houthakker (cited in footnote 7) demonstrates the importance of the rate of discount selected in its effects on capitalized values of total lifetime incomes even after allowing for mortality. Because of differences caused by education in the time distribution of lifetime income, the higher the discount rate used the lower the resulting educational differentials in capitalized values. His figures are for total—not merely earned—incomes; this exaggerates the effects. However, the discount rate chosen will have a significant effect on the weightings of the various education categories even when earned incomes only are considered.

Choice of a discount rate when the analysis is in the context of individual decision-making (Houthakker's frame of reference) involves considerations somewhat different from those that are most pertinent for purposes of measuring aggregate human capital. For the latter purpose, risks (and risk aversions versus gambling propensities) can be ignored. This narrows the range of discount rates that might "reasonably" be used; presumably a "gilt edge" rate would be a maximum.

Denison argues for a cost based physical capital formation measure such that—

> . . . if the costs of two types of capital goods were the same (or would have been the same were both newly produced) in the year in whose prices the measures are expressed, they are considered to embody the same amount of capital regardless of their ability to contribute to production.[19]

Applying a similar approach to measurement of the educational component of human capital leads to a valuation of each year of schooling at its base-year cost—the method used by Schultz in comparing the educational "stock carried" in the populations of 1929 and 1957. The only important difference is that in the case of physical capital, virtually all costs involve market exchanges, whereas a large element in the costs of formation of educational capital is the earning forgone by students—"opportunity costs." From a social point of view, these opportunity costs measure the sacrifice of consumer goods and services involved in allocating the labor time of students to schoolwork. But direct outlays on educational plant and equipment and services of teachers and other school staff—like all outlays in the production of a physical capital good—are also rough measures of opportunity costs. Thus the base-year weights are in both cases approximate measures of real costs in the meaning of base-year consumer goods and services forgone. Subsequent shifts in the composition of physical capital toward, for example, relatively more of the kinds of capital the production of which required (in the base year) large proportions of skilled workers will be reflected in a rise in the measured "quantity of capital," other things aside. This is consistent with the interpretation that the quantity of capital has risen in terms of the consumption that would have been forgone to produce it in the base year.

Base-year money-cost valuation of physical capital deviates systematically from a base-year real-cost measure in terms of labor time and waiting. I shall avoid interminable complexities by considering only labor time for physical capital. To start with, the base-year cost valuations count a man-hour of expensive labor as more than a man-hour of cheap labor. If the composition of capital remained unchanged, estimated rates of capital formation would be the same (so far as the labor element is concerned) as the rates of increase in labor time that would have been required to produce it in

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[19] Edward F. Denison, "Theoretical Aspects of Quality Change, Capital Consumption, and Net Capital Formation," in Conference on Research in Income and Wealth, *Problems of Capital Formation, Concepts, Measurement, and Controlling Factors*, Studies in Income and Wealth, vol. 19, National Bureau of Economic Research, Princeton, N.J., Princeton University Press, 1957, p. 222. *See also* Denison's discussion of employment versus man-hour series as real-cost measures and as "effective labor input" measures in his "Measurement of Labor Input," pages 347–372 in *Output, Input and Productivity Measurement, Studies in Income and Wealth*, vol. 25, Princeton University Press, 1961.

the base year. However, a shift to kinds of capital requiring more expensive labor and away from those requiring cheaper labor (at base-year rates) would lead to a measured increase in capital without any change in the total undifferentiated man-hours that would have been needed to produce it in the base year.

Similar considerations apply to the cost measures of educational capital. However, they may come fairly close to base-year labor-time real-cost measures because the estimates of actual consumption forgone for the various schooling levels are correlated with real costs in terms of labor time. It is the opportunity cost component that accounts for this. A change in the composition of aggregate school years that increases the proportion of college years in the total will raise aggregate opportunity costs (and hence measured capital) for a given total of school years because these costs are higher for college than for lower levels of schooling. But if student time is regarded as work, it is clear that a college year (at least in the United States) entails more direct "labor" than an elementary-school year.

Unless interest rates are built into the cost estimates, real costs of waiting are of course underestimated for the higher levels of education relative to the lower. This means that a shift to a larger proportion of college years in the aggregate of schooling will underestimate the increase in human capital in base-period real costs of waiting.[11]

E. APPROXIMATIONS TO CURRENT REAL COSTS

As Denison has pointed out, his measure of capital is not equivalent to a current real-cost measure either in consumption forgone or in terms of labor and savings. This applies to base-year cost measurement of human-capital formation as well. To attempt measurement of either physical or human-capital formation in terms of current consumption forgone would make nonsense of productivity analysis by building increases in national levels of living into the capital measures. This is strikingly obvious if one looks at American college students' consumption forgone in the 1930's versus that taking place today. It is appropriate to look at current consumption forgone in the context of current decisions concerning allocation of resources to education, but such a concept has no place in measurements of changes over time in the quantity of capital.

If we view real costs in terms of labor time and waiting, it is equally clear that the costs of capital formation being considered are not equivalent to current real-cost measures. The deviation from current real costs in the case of physical capital will be of considerable magnitude if advancing technology (broadly defined) permits output of the same capital good today at a real cost in labor and saving significantly less than in some base year. Again, similar deviations from current real-cost measures are involved in the case of human capital, but they are of lesser magnitude.

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[11] This problem is discussed in the section on labor force participation and withdrawals, later in this chapter.

Base year money-cost valuations of human and physical capital are alike in excluding from "changes in quantity" two types of quality changes: changes in the efficiency of the resources (or of their organization) involved in producing the capital and changes in productivity per measured unit of capital formed. The fact that real labor and waiting costs of forming physical capital have declined more rapidly than real costs of forming human capital has some interesting implications for interpretation of empirical observations concerning growth rates in physical versus human capital. The ratio of human-capital growth rates to physical-capital growth rates measured in current real-cost units would evidently be greater than that indicated by measurement in base-year money costs.

III. Some Special Considerations in Cost-Based Measurement of Human-Capital Formation

Most estimates of gross (and net) physical-capital formation are convenient compromises with bookkeeping practices. As such they start with values in current dollars. Various devices for deflating these figures to a constant dollar base have been used. However, the diversity of physical capital (even when only plant and equipment are considered) and the rapid changes in its composition pose problems of far greater magnitude than are involved in cost measures of the educational component of human capital. There is no underlying basis for identifying units of physical capital comparable to school-year equivalents,[9] nor can a few major components analogous to levels of schooling be as readily identified.

On the other hand, cost measures of gross human-capital formation run into special difficulties. The most important set of problems is in the sorting out of investment in human producer capital versus immediate consumption and, more important, investment in human consumer capital. This is awkward enough even when attention is concentrated on the educational component only, but it is much more serious when a broader definition of human capital is considered. A second set of problems is the estimation of opportunity costs of student time; only one of these problems, the treatment of unemployment, will be discussed here. Finally, some interesting considerations arise in examining the question of whether to count as part of human-capital formation the costs of schooling persons who leave school after only a few years.

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[9] The concept of a "school-year equivalent" as a measure adjusted to a constant number of days in attendance was elaborated by Clarence D. Long in his *The Labor Force Under Changing Income and Employment*. Princeton, N.J., Princeton University Press, 1958. Schultz used the Long method of estimating school-year equivalents.

THE CONSUMPTION-INVESTMENT COMPLEX

Commenting on the inadequacy of conventional definitions of investment in national income and productivity studies, Abramovitz referred to an underlying "more fundamental concept which is broader: namely, any use of resources which helps increase our output in future periods."[18] In this broad view there is relatively little human consumption that is not in some degree also investment in either human capital formation or its maintenance. The problem of cost allocation between consumption and investment then becomes in part a typical joint product case that poses the question of how overhead costs should be allocated among the products. The chief difference is that economists discussing the distinction between investment and consumption with respect to the human factor often turn to consideration of the motivations of the spender. For theoretical analysis of individual decision making and preference functions, this is clearly appropriate. However, when the problem is one of measuring the growth and composition of productive resources (in this case specifically of the human resource), the motivations behind resource formation are not the primary consideration.

Counting all base-year costs of education per school-year equivalent as "investment" in human producer capital amounts to treating all consumption products of this measured education, other than investment in human labor, as "zero-cost" byproducts. But these zero-cost consumption returns are omitted from the national-income accounts also. For some purposes simply omitting the cost of educating all men and women not in the labor force is a possible compromise.

Training man's mind aside, the costs of forming human capital are primarily those involved in building his physical condition. But many of the outlays that have this effect are also consumer priorities of the first order, and with minor exceptions any assessment of rates of return on such outlays viewed as investments in producer capital is meaningless unless the men are slaves. The usual solution in studies of productivity has been simply to count men (or, more frequently, man hours). For time-series analysis this has the same result as if we were to assign any fixed dollar value, however estimated, to a man (or a man hour), and it carries the implication that a "man" is the same physically from one generation to the next. All intergeneration changes in physical health are ignored and thus thrown into the "qualitative" residuals.

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[18] *Resource and Output Trends in the United States Since 1870.* New York, National Bureau of Economic Research, Occasional Paper 52, 1956. p. 12.

Conceptually it may be helpful to view the physical formation and maintenance of human capital as composed of two parts. The first is some minimum necessary for survival of a given number of potential labor-force members (taking into account mortality rates and allocating total costs among survivors). The simple count of numbers of men may then be interpreted as the equivalent of assessing this survival minimum at a real cost that is constant through time. The second component changes over time with improved nutrition, medical services, and so forth. In regarding outlays that improve health as totally consumption, an important change in human capital is ignored. On the other hand, to handle them all as investment outlays on producer capital with zero cost consumption byproducts (even if only members of the labor force are included) is to throw a large part of consumer gains into the factor-cost measures, and so to eliminate factor productivity increases virtually by definition. No cost-based measure of this component seems feasible at present—not merely because of the difficulty of measuring costs but also because of the immediate consumption and the consumer-capital elements involved.

If rates of change in health components of human capital are closely correlated with changes in the cost measures of human-capital formation through education, the relations between the latter and growth in the national income will incorporate effects of better health as well as of education *per se*, whatever the causal interpretations. If not, proxy variables for changes in health might be plugged into the time-series models. A variable that immediately suggests itself is adult morbidity rates, justified on the assumption that changes in these rates provide a good index to the physical capacities of survivors in the labor force. But however closely such an index may be associated with changes in men's physical capacity for production, there is no justification for interpreting it as an index of human-capital formation in cost terms. It is more consistent conceptually with an efficiency-equivalence approach to measurement of human-capital formation.

THE TREATMENT OF UNEMPLOYMENT IN ESTIMATES OF OPPORTUNITY COSTS

Taking the approach of traditional marginal analysis combined with probability theory, the opportunity-cost component of educational costs at a given time has been measured by an estimate of the wage income the student would earn if he were to get a job, reduced by the proportion of the population of his age (ideally also of equal prior training) who are unemployed. As an approximation to a measure of opportunity cost from the point of view of the average individual, that is, of private opportunity cost, this is probably the best way of handling the problem. When unemployment is widespread and chronic, it might be argued that social as distinct from private marginal opportunity costs are zero in the short term so long as the number of jobs available is not altered by the number of young people in the labor market, but this argument would apply equally to all unemployed resources, physical as well as human, and it excludes consideration of alternatives such as public works. Such validity, if any, as may attach to it is in any case limited to short-term marginal valuations, whereas we are interested in long-term averages and aggregates. When long-term aggregate human-capital formation is the focus, social opportunity costs are not zero even with chronic unemployment, and the traditional approach mentioned above is probably the best alternative as a measure of social as well as private costs.

Unfortunately, this pragmatic solution is still ambiguous. The rate of unemployment varies from year to year, but to build these variations into cost estimates according to the years in which each age cohort was trained would distort measures of changes in human capital as a resource available to the economy. Selection of a base year or at least an unemployment rate that may be regarded as in some sense "normal" is the only possible solution—even though definition of what is normal is inevitably somewhat arbitrary. The higher the unemployment rate regarded as normal, the lower the estimated opportunity cost fraction of total educational costs.

EDUCATIONAL CAPITAL AND THE "UNDEREDUCATED"

Although the educational component in human-capital formation is the one most amenable to measurement, an awkward problem arises in connection with the semiliterates who leave school after a few years only. This becomes most visible when adjustments for capital consumption are attempted as part of the task of measuring the educational component in net human-capital formation. For that purpose it is necessary to identify the lifetime patterns of incomes attributable to education as distinct from the total earnings of the average man in each educational category. But the "undereducated" pose issues that are basic to the logic of treating education as human-capital formation in the first place.

For those who continue in school, contributions of schooling to gross human-capital formation clearly begin with the first years, which lay the foundations for what comes later; obviously costs of these early years should be included in the cost valuations. However, evidence concerning lapses into illiteracy strongly suggest that 2 or 3 years of schooling is almost total waste when schooling is not continued.

It might be argued that costs of schooling of men who have left school before, say, the third or fourth grade are part of the costs of educating those who continue, and should thus in effect be allocated to the latter. However, as school years per man rise, the aggregate of years embodied in men with less than 3 or 4 years of schooling grows smaller and smaller; thus the educational costs of the undereducated to be allocated to those who continue in school become a smaller and smaller figure both absolutely and relative to the aggregate. Since, in addition, a rising proportion of relatively well-educated men tends to have the indirect effect of raising the absolute productivity level of the shrinking minority of the undereducated (of any given ability level), the perverse performance of this element in costs is all the more awkward.

This suggests that a reasonable alternative in a society in which only a small minority stop before 3 or 4 years of schooling would be to regard outlays on their schooling as analogous to laying the foundations of a building and going no further. The building remains unfinished and expenditures on the foundation add nothing to the available capital stock of the society. However, this is an extreme position. A more reasonable solution might be to weight these years for the undereducated at some fraction of their costs.

IV. Net Human-Capital Formation

One of the knottiest problems in all physical-capital measurement is that of adjusting for capital consumption to arrive at net capital-formation measures—the net effects of appreciation, depreciation, and obsolescence. Fortunately, it is much easier to make reasonable estimates of the time flow of yields and hence of capital consumption and net capital formation in the case of human than of physical capital. Though a durable capital good, human capital is continuously for hire and its "rent" is continually given a value in the market. Physical capital in the form of plant and equipment is not so regularly either rented or sold after its initial purchase by the user.

Conceptually the analogies between human and physical capital are clear enough, but there are some significant differences in the relative importance and the behavior of the various elements determining the distribution of returns through time. An important element in the case of human capital is mortality or withdrawal from the labor force due to illness, accident, or other causes before normal depreciation or even obsolescence has taken its toll. Analogous losses to physical capital through accidental damage, such as fire, are of much less importance. Appreciation with experience appears to be an important element in the time flow of yields from units of human capital, but after a very short breaking-in period, appreciation of physical capital is rare—as the frequent textbook citations of old wine attest. Human capital, like physical, suffers from depreciation, though if human capital is not worked too hard, its rate of depreciation is more likely to be retarded with use than speeded up. Finally, human capital, like physical, suffers from obsolescence, and the more dynamic the economy, the higher the rates of obsolescence. Yet here again there is a significant difference. Human producer capital, and even the educational component of that capital, is less specialized than most physical producer capital. As a result, obsolescence does not sweep away the yield of a unit of human capital or even of the educational component of such a unit to the degree to which this occurs with physical capital. For practical purposes of measurement it is convenient, and in the case of human capital feasible, to ignore consideration of obsolescence as distinct from depreciation, treating them jointly.

Treatment of appreciation of human capital calls for special comment.[14] Over the years between completion of formal schooling and attainment of maximal annual earning capacity, there is, of course, "education" in that continued learning is involved. The increases in productive capacity over these years could be viewed either as further human-capital formation or as entirely analogous to depreciation (that is, simply as an aspect of the time flow of returns inherent in the nature of the original capital when it is put to use). To the extent to which a reduction of earnings in the earlier years is a condition of acquiring the capacity to earn more later, an opportunity cost is involved: the observed sequential increase in earnings is then, in part at least, a reflection of continuing capital formation measured in cost terms. Under these circumstances even informal on-the-job training is thus capital formation. However, much of the observed increase in earnings with age entails no additional costs of any kind. Thus, while treatment of rising annual earnings as appreciation proper rather than as additional capital formation is not an ideal solution, neither is it an entirely unreasonable pragmatic simplification.

Given this simplification, the basic logic involved in using data on the lifetime patterns of yields as a basis for estimating capital consumption is also simple, even though actual measurement becomes complicated. What is required is an allocation of the original value (however measured) of a unit of capital through time in accordance with the proportion of its lifetime productivity that has been used up. Upon retirement the entire original value, neither more nor less, is accounted for. But this raises two types of questions: What assumptions are involved in using age-income data as measures of lifetime real productivity patterns per surviving member of the labor force, and what is the appropriate way to deal with changing labor-force participation rates and withdrawals from the labor force?

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[14] For some valuable sidelights on this problem, see the excellent study of "Investment in Human Capital and Personal Income Distribution," by Jacob Mincer, in the *Journal of Political Economy*, 66:281–302, August 1958. A brief analysis of opportunity costs involved in apprenticeship training is included in Paul G. Keat, Long-Run Changes in Occupational Wage Structure, 1900–1956, *Journal of Political Economy*, 48:584–600, December 1960.

AGE-INCOME DATA AS MEASURES OF LIFE-PRODUCTIVITY CYCLES FOR LABOR-FORCE SURVIVORS

Two basic assumptions are involved in the use of age-income data as measures of real life-productivity cycles among survivors in the labor force. First is the assumption that within each education category (or other categorization of the population) the ratios between incomes at any two ages represents a stable historical life cycle that is repeated with each successive age cohort. The absolute level is irrelevant; it is only the distribution through time with which we are concerned. Second is the assumption that the age distribution of private earned incomes is proportional to that of social returns.

At first sight the assumption that distribution of earned incomes in any single year will apply longitudinally to successive age cohorts in a given educational category seems to be quite untenable. The difficulty is not merely that during a man's lifetime changes in the economic structure may shift the relative market advantages of the various age-education groups; it is also that changes in rates of unemployment through time hit successive age cohorts at different points in their life cycles. This can have effects of considerable magnitude on the time pattern of income per member of the labor force in one age cohort as compared with another. However, it can reasonably be argued that allocations through time for consumption of human (as of physical) capital should not be sensitive to short-term fluctuations in employment—that these have virtually nothing to do with the "amount" of the capital stock or net capital formation in any meaningful sense. If this argument is accepted, then the relevant estimates of lifetime flows will take account of average rates of unemployment for each age-education category, but will ignore fluctuations in these rates. Average or "normal" unemployment rates are important in this context only as they have a different incidence for different age groups within any one educational category. The income averages used to build up the appropriate time flows are then averages for the entire labor force within each age-education group after adjustments for "normal" rates of unemployment.

For the purpose of allocating capital consumption through time, discrepancies between private incomes and real productivity from a social point of view are irrelevant provided these discrepancies are of the same relative magnitude at each age within each education category: differences in the ratios of social to private returns between education categories at any given age will have no effect on the capital-consumption estimates. A priori, age constancy of these ratios is probably a better approximation to the true picture for the average income streams in the pre-secondary education categories than is any alternative assumption. However, some systematic distortions seem likely in the higher education categories. The observed incomes of men in the middle-age brackets are probably too low relative to younger and older men. Two factors are involved. First, in a dynamic society each new cohort of men with a given number of years of schooling enters the labor force better equipped in knowledge and know-how than its predecessor. An extreme illustration is provided by recent changes in engineering. This means that the younger men earn (and produce) more than their predecessors did at the same age. The result is a flattening of the age-income curve, which rises less than it would with the appreciation of productivity with experience in any single age cohort. Today's young men will in turn gain through experience and receive higher incomes in their middle years than they receive now (or than men now age 40 receive), but they may be followed by a new cohort that is still more productive. This is an inverse way of looking at the obsolescence process. Second, the age-income curve is probably flattened again at the upper age levels relative to a true productivity curve, for status and seniority rules maintain income of older men even when their real productivity is falling.[15] However, this distortion is partially neutralized because the middle-age cohort is more productive age for age than the older one.

A WAY OF HANDLING LABOR-FORCE PARTICIPATION AND WITHDRAWALS

A true life pattern of yields to any given kind of human capital, let us say for the moment male secondary-school graduates, must adjust average productivity per member of the labor force at each age to take account of the proportion of men who have dropped out, whether temporarily or permanently. The measure wanted at each age is earned income per initial member of the age cohort, not average income per active survivor. Initial members would be counted as the number at the age at which the level of education involved is normally completed.[14] Adjustments for labor-force participation may therefore be greater at the earliest ages than a little later; strictly speaking, it is not just "survivorship" that is involved.

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[15] The fact that older men have greater difficulty in finding jobs when they have become unemployed brings about a failure to utilize their productive potentials. This reduces the average income per labor-force member in the upper age brackets. However, it does not affect the relation between actual productive contributions of older men (*real* outputs) and their privately realized earned incomes.

A simple adjustment has been applied to obtain estimates of average incomes per initial member, using U.S. data for males and taking 1950 as the base year in distribution of lifetime yields (including "normal" unemployment rates by age-education categories). The first figure needed was a survival rate based on mortality tables—a standard demographic measure of the number of men at each later age surviving per thousand completing a given amount of schooling. Then for each age-education category the rate of labor-force participation was computed. The product of these two rates yields a "labor-force survival ratio." Multiplying observed average earned incomes per member of the labor force in a given age-education category by the appropriate labor-force survival ratio gives average income per initial member of the age cohort involved, here termed income "per entrant." This provides the basis for proceeding to estimates of net human-capital formation.

LIFETIME YIELDS AND NET CAPITAL FORMATION IN BASE-PERIOD INCOME UNITS

With acceptance of the cross-section age-earnings data as the best available measures of lifetime real productivity patterns, the method of estimating lifetime yields suggested by the preceding discussion may be summarized briefly:

1. Base-year earnings per member of the labor force are computed for each age-education category, allowing for a "normal" rate of unemployment for this category.

2. These earnings are adjusted downward by applying labor-force survival ratios to obtain base-year incomes per entrant.

3. Earnings per entrant for each age are added (each year being given a weight of 1) to get total lifetime yields for each education

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[14] This is the point at which the production of the new unit of human capital is completed. Analysis of rates of return to educational investments properly take age 14 (for the United States) as the starting point for all education groups, but our problem is a different one. The logical procedure is to focus either on the point at which the capital is completed or on that at which the first investment occurs. Taking the former view, in a human-capital measure based on lifetime earnings there should be no discounting for years prior to the point at which the new capital is complete, even if subsequent yields are discounted. On the other hand, when cost valuations of the educational component are used, refinement of the estimates to take interest into account would require allowances for interest on each successive investment from first grade on for the period required to complete each level of schooling. Alternatively, a puristic view of real costs of waiting would require carrying interest charges up to the dates of receipt of incomes. Analogously, a puristic treatment of discounting in a yield-based measure would include children who were still below working age as already embodying some capital (positive or negative). This would approach the capital concept in Dublin and Lotka (cited in footnote 2).

category. (A refinement of this would first discount each income per entrant back to the normal completion age for the educational category involved.)[17] These sums are the measure of the capital value per initial member of each education group in base-period lifetime income units without discounting.

It is then a very simple matter to estimate capital consumption, net capital stock, and net capital formation in base-year earned-income units. A year's aggregate capital consumption for each age-education category is simply base-period income per entrant, multiplied by the number of entrants in that category. Summing these figures gives the year's aggregate human-capital consumption. Net capital stock embodied in an average individual in any given age-education category is the base-period lifetime yield for that category minus its cumulated capital consumption. Multiplying this figure by the number of such individuals in the labor force and summing the results for all age-education categories gives a measure of net capital stock. Comparing this total with the total for any other year gives a measure of net human capital formation during the interval.

CAPITAL CONSUMPTION AND NET CAPITAL FORMATION AT BASE-PERIOD COSTS

Some minor modifications of this procedure are needed to arrive at estimates of net human-capital formation at base-period costs. First of all, cost valuations as discussed here apply only to the educational component of human capital. This means that earned incomes per entrant among men with no education must be subtracted from the earned incomes per entrant initially computed. Summing these net or incremental incomes per entrant gives the appropriate lifetime income for each educational category.

However, even if the base year is the same, this measure is not directly comparable with the cost valuation of new capital. An intermediate step is therefore required before capital consumption can be estimated. The percentage of lifetime earnings accruing in each year of age is computed, and these percentages are then applied to the cost valuations of new capital per man in the education category. This gives the figure for capital consumption per member of the labor force in each age-education category. From this point on, the procedure is identical with that described for estimating net capital formation in base-period income units.

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[17] See footnote 16. Another alternative might be considered most appropriate when human capital is measured in base-year lifetime-income units. Remaining future incomes "per entrant" could be discounted to the "present" before summation to get the estimate of net capital stock. Net capital formation over a year is then "present" value as of the end of the year, minus "present" value as of the beginning of the year. The greater task of computation aside, this approach has the disadvantage that the sum of capital consumption estimates over a lifetime will not equal the original value of the new capital. Though summation of the successive capital consumption estimates for a unit of capital would give a lifetime total smaller than the aggregate of undiscounted yields, it would exceed the value of original capital computed by discounting incomes back to the year of completion of schooling.

V. Effective Current Stock

Studies of productivity change as evidenced by relations between aggregate factor inputs and gross or net national product have used estimates of physical-capital stock not because any of these is the conceptually correct measure but because nothing comparable to what has been termed "effective current stock" is available for physical capital; Solow explicitly recognized this problem (see footnote 3). In dealing with human capital we are more fortunate, primarily because there is a better basis on which to assess lifetime distributions of yields. "Effective current stock" measures the relevant potential current inputs of human capital much more directly than other capital concepts.

Estimates of the rates of gross and net capital formation and of changes in effective current stock will differ to an extent depending upon the degree of contrast among educational categories in age-income patterns and the magnitude of changes in educational attainments from one age cohort to the next. Changes in age composition of the population will also affect the results. Choice of "effective current" stock rather than some other measure of human capital is therefore empirically important as well as conceptually sound in attempts to compare year-to-year changes in human-factor inputs and their relation to national product. For this purpose either a cost or a yield base-year measure can be used, but these variants do not measure quite the same thing; the differences between them are analogous to those already discussed in comparing base-year income and cost weightings of gross capital estimates.

Schultz used a "stock carried" estimate of the educational component of human capital that might be regarded as a first approximation to a measure of "effective current stock at base-period cost." "Stock carried" equals capital formation at base-period cost over the past lifespan of the present labor force, minus whatever was invested during this period in people who have died or have left the labor force for other reasons. The time pattern of yields from a unit of human capital is ignored. Using this measure as an approximation to effective current stock assumes that education embodied in human capital has a yield flow that starts out at a level that is maintained unchanged until the capital suddenly and completely disappears.[18]

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[18] As an approximation to a measure of net human-capital formation in a growing population, this underestimates rates of capital consumption, since aging of men still in the labor force is ignored. It amounts to making the obviously untenable assumption that total remaining future lifetime earnings (whether or not discounted) are the same for all ages.

It is a comparatively simple matter to convert such a measure into "effective current stock" in base period cost units by the use of age income data such as were employed in arriving at net educational capital-formation estimates. However, the procedure would be different. No adjustment by "labor-force survival ratios" is required. The incremental income average wanted for each age-education category is just average income per member of the labor force, minus the corresponding average for the uneducated, or undereducated, group that is excluded from the educational component of human capital. The procedure is then as follows: (1) A simple incremental average annual income is computed for each education category, giving each year of age equal weight; (2) ratios of incomes at each age to the average for all ages within each education category are computed; (3) the base-period cost value of a new unit of human capital for the education category involved is multiplied by the income ratio for each age, giving a set of figures for effective current stock per man; (4) effective current stock per man in each age education category is multiplied by the number of men in that category in the labor force; (5) the estimates obtained in (4) are summed to give aggregate effective current stock at base-year costs.

A similar procedure gives effective current stock of the educational component in base-year earned-income terms. The only difference is that the base-period value of a new unit of human capital is its estimated base year lifetime income. Estimation of effective current stock of the total of human capital, not merely its educational component, is similar; but the average earned incomes used include the incomes of the uneducated or undereducated, and the investment in the labor force below the education cutoff point is valued and included in the aggregate. It should be noted that this last measure is one way of adjusting a total labor-force count to take into consideration both its age and its educational composition.

Ideally, to convert an "effective current stock available" series into an "effective current stock utilized" series requires adjustment of the labor-force multipliers in step (4) for changes in unemployment rates. This would be done for each year by multiplying the number of persons in each age-education category in the current labor force by the appropriate ratio of current to "normal" rate of unemployment. However, unemployment rates by age and education are rarely available year by year. A cruder adjustment, but one that would give a good approximation, uses the ratio of the current rate of unemployment regardless of age and education to the corresponding normal rate. The aggregate effective current stock estimates for all education and age categories together is then multiplied by this ratio to get current human-capital inputs.

VI. Conclusions

Having argued for the feasibility of human-capital measurement and suggested several types of measures, I must offer a word of warning. No measure, not even an unattainably "perfect" one, can solve the problem of determining the contributions of education to economic growth. The difficulty here is in the very nature of the question posed, and it applies equally to attempts to assess the role of any single factor. An entire *Gestalt* is involved, and hence analysis in terms of a multiple-factor matrix is needed. In such an analysis the role of any single factor emerges for what it is—a conditioned role dependent on the movement of other factors. Moreover, estimates of its importance will depend upon which other factors have been included in the matrix. Each method of dealing with the measurement of education's contribution to economic growth has its own defects. Time-series analysis in terms of aggregates has been the usual approach in assessing the role of physical capital, man-hours of labor, and the catchall third factor, *t*. Introduction of human-capital formation series (or more specifically the educational component of human capital) into such an analysis is one possibility. This has the advantage that social returns not reflected in private-income differentials associated with schooling differentials may be captured; but interpretation runs into serious problems of circular causation because growth in education reflects growth in national income as well as affecting it. Schultz's approach, which applies rates of return on incremental investments in education to cost estimates of the educational stock, avoids this circle. However, it runs into trouble because of the difficulties of distinguishing educational factors from other factors associated with education that affect income differentials, because of divergence of social from private returns, because noneducational changes in structural relationships that are a part of growth are ignored, and because "fallacies of summation" are involved. The best we can do is to use several approaches and compare the results. In dealing with this problem, economists would be well advised to keep continually in mind Åkerman's strictures concerning causation, fallacies of summation, and the importance of structural shifts. These reflections suggest four next steps.

First, we need further experiments with the measurement of human capital in its various aspects, and the sensitivity of these measures to some of the assumptions that have to be made in adapting empirical data. Such exploration may contribute not only to better measurement but also to conceptual clarification.

Second, aggregative analyses of factors in the growth of national income in various countries should be elaborated by introduction of human-capital formation series. Where the data permit, effective current stock measures should be used. But even in these cases other measures should be tried also, in particular those for which data are most commonly available, so that direct international comparisons are possible. This means a rough cost-based measure of the educational component of human capital, perhaps at first essentially Schultz's "stock carried" measure, in some cases estimating years of schooling embodied in the adult population by projections of earlier data on enrollments, adjusted for mortality and migration.

Third, aggregative analysis using lagged variables is needed—if possible in combination with geographic and international comparisons. For example, changes in outlays on education of youth may be compared with lagged changes in incomes as part of a multiple-factor matrix "explaining" income change. Then, as a check on the problem of two-way causation, changes in educational outlays may be taken as the dependent variable and lagged after changes in incomes. Such an analysis involves comparisons of gross human-capital formation, not capital stock (by any definition), with income. It would go further than anything yet attempted toward the type of "causal" analysis on which Åkerman has laid so much stress.

A *fourth* task is to break human-capital data into several series for types or levels of education, to explore the interrelations among these, and, finally, the nature of the educational "mix" in relation to other factors associated with economic growth. Though data are limited, they are sufficient in a number of countries to make breakdowns of this kind in stock-carried estimates even when estimates of effective current stock are not possible. International comparisons of the paths of the various components of the aggregate stock of education embodied in the population and their relation to economic structure and growth should at the least open up some fresh insights into important but elusive problems.

CHAPTER 7

Rise in the Capital Stock Represented by Education in the United States, 1900–57

*Theodore W. Schultz**

INVESTMENT in human capital is a distinctive and important feature of the economy.[1] People invest in themselves, and these investments have become large, and knowledge about the human capital that is thus formed is fundamental to an understanding of economic growth. A major source of this human capital is education.

To look upon education as an activity that develops human capital is not to disparage its cultural purposes,[2] but among its other contributions are knowledge and skills that are useful in economic endeavor. Economic progress is greatly dependent upon these contributions. Surely the most universal limiting factor in achieving economic growth is ignorance. For attaining an optimum rate of such growth, investment in skills and knowledge is essential.[3]

Education has various measurable dimensions, which differ depending upon the purpose of the measurement. School attendance is one such; others are the years of schooling completed and the number of students finishing elementary school, high school, and college. The real cost entering into education is still another way of measuring education.[4] It is indeed meaningful to treat education as something that is measurable.

Economists make much of the distinction between *flows* and *stocks*. Investment is a flow; plants and equipment are stocks. Land is a

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*Department of Economics, University of Chicago. This chapter was based on Professor Schultz's essay, "Education and Economic Growth," in the National Society for the Study of Education 60th Yearbook, Nelson B. Henry, ed., part 2, *Social Forces Influencing American Education, 1961.* University of Chicago Press, 1961.

[1] Theodore W. Schultz, Investment in Human Capital. *American Economic Review*, 51 : 1–17, March 1961.

[2] It is necessary to underscore this point because of the widespread apprehensions that arise whenever economic analysis is brought to bear on education. I have gone to much trouble to take account of these apprehensions, as may be seen in my "Investment in Man : an Economist's View," *Social Service Review*, 33 : 109–117, June 1959 ; and also in more recent papers referred to herein.

[3] Branko Horvat. The Optimum Rate of Investment. *Economic Journal*, London, 68 : 747–767, December 1958.

[4] Theodore W. Schultz. Capital Formation by Education. *Journal of Political Economy*, 68 : 571–583, December 1960.

stock; the productive service that it renders is a flow, and so is rent. The size, composition, and capabilities of the labor force represent a stock; the work that is done in an hour or a week is, on the other hand, a flow, and so are wages and salaries. Inputs, whether they are the results of the efforts of man or the contributions made by material things, are all flow concepts. The natural endowment (land); reproducible physical capital (plant, equipment, and inventories); and the labor force (workers) are all stock concepts.

The connections between additions to the stock of capital as a store of wealth and the corresponding additions to output capacity are very intricate.[9] Things that differ only with respect to durability may represent different stocks of value, although their annual output capacity is the same. Consider two engineers who are equally capable and who do the same amount of engineering work during a particular year. Their respective contributions as engineers during that year are the same, although the two may be very different when viewed as a stock of engineering capabilities because one of them may be a young man just starting his career and with a long productive life ahead of him, and the other an old man doing his last year of work before he retires. In gauging the value of the stock of engineering capabilities, the age of engineers is therefore important.

Education is more durable than most forms of nonhuman reproducible capital. A high-school education, for example, will serve the person during the rest of his life, and of this period 40 years or more are likely to be spent in productive work. Most nonhuman capital has a much shorter productive life than this. Education can be augmented because it is durable, and the fact that it has a relatively long life means that a given gross investment adds more to the stock than the same gross investment typically adds to the stock of nonhuman capital.

In the United States young people entering the labor force have on the average more education than older workers. When the young people who enter the labor force have more education than the old people who are retiring, the value of the stock of education in the labor force rises, even with no change in the number of workers. Such has been the case in the United States for a long time. Though younger workers back in 1900 had only a little more schooling than older ones, this difference has become much larger, much to the advantage of those in the younger age groups. The stock of education accordingly becomes more valuable in two ways: (1) The level of education of the population rises, and (2) a larger share of the total education is embodied in the younger workers than formerly.

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[9] Trygve Haavelmo. *A Study in the Theory of Investment.* University of Chicago Press, 1960. p 12–17.

Why Estimate the Stock of Education?

Estimates of the stock of education may seem remote and academic to persons who are concerned about expenditures for classrooms and for teachers' salaries. There are, however, issues that can be settled only through knowledge about the stock of education: What are our scientific and engineering capacities and at what rates are these increasing? We are constantly devising better methods for measurement of inventories, plants, equipment, natural resources, and other forms of capital because such measurements are necessary in gauging changes in them. Similarly, there is a growing awareness that knowledge is required about changes in the stock of human capabilities.[6]

Comparisons of skills and knowledge in different countries are based as a rule on crude guesses concerning the respective stocks of education. To illustrate, in the United States the number of persons with a high school or a college education has been rising in relation to the number of persons in the labor force. This kind of advance in education has also been taking place in some other countries. Yet the differences among countries in the rates of this advance are impressive. Countries in Western Europe have lagged in this respect compared to the United States, whereas Japan and more recently the Soviet Union, both starting from much lower levels several decades ago, have been moving ahead at a higher rate than has the United States. Moreover, it is altogether possible for the level of education of the labor force to decline, as it appears to have done in recent years in East Germany mainly as a consequence of the large outmigration of doctors, teachers, lawyers, and skilled technicians. Israel's unique pattern of immigration is also instructive. There came to Israel a large number of highly educated people. But there were not enough secondary schools for preparing young people for college and university instruction to maintain the high level of education which the immigration of talent had established. Thus, until enough secondary schools and college and university facilities were established, there was a prospect that the level of education of the labor force would decline.

International and other comparisons aside, the economist is turning to human capital to see whether changes in the stock of such capital will account for the otherwise large unexplained increases in output. As things stand, increases in nonhuman capital and in man-hours combined appear to account for only a small fraction of the increases in national income.[7]

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[6] There is already a substantial body of literature treating human resources, talents, and skills, and the demand for and supply of scientific and other personnel.

[7] "Education and Economic Growth," op. cit., pp. 49–50.

Three Measures of the Stock of Education

The alternative measures that follow are at this stage only clues to what we are seeking. This is necessarily only a progress report. First we examine the concept of a *year of schooling completed* as a unit of measurement. National statistics based on this concept are readily available and they are widely used. Next we present an *equivalent year of schooling completed*, based on 1940, when the average period of school attendance was 152 days. A third measure will then be developed, based on the *real cost of a year of schooling.*

YEARS OF SCHOOLING COMPLETED

Although "years of schooling completed" is a convenient unit of measurement, it is like counting the acres of land in farms without taking any account of the differences in land; an acre of low-productive semidesert land and an acre of highly productive irrigated land are simply added together. Likewise, we can aggregate the education of a population by counting the number of years of schooling completed as one might count acres, houses, or tractors.

Table 1 presents the results of such a count for education. It shows that the years of schooling completed per person rose by about two-fifths between 1900 and 1957. It follows, of course, that the total number of years of schooling completed rose relative both to the population and to the labor force. If each year of schooling completed were the same in amount and value, the inference would be that the stock of education in the labor force, measured in this way, increased somewhat more than 3½ times (from an index of 100 to 359) between 1900 and 1957.

TABLE 1.—Years of schooling completed by the population 14 years and older and by the labor force 18–64 years of age, United States, 1900–57

Year and index 1957	Population			Labor force		
	Number (millions)	Years of schooling completed per person	Total years of schooling completed (millions)	Number (millions)	Years of schooling completed per person	Total years of schooling completed (millions)
1900	51.2	7.64	391	28.1	7.70	216
1910	64.3	7.86	505	35.8	7.91	283
1920	74.5	8.05	600	41.4	8.12	336
1930	89.0	8.32	741	48.7	8.41	410
1940	101.1	8.85	895	52.8	9.02	476
1950	112.4	9.95	1,118	60.1	10.10	607
1957	117.1	10.70	1,253	70.8	10.96	776
Index 1957 (1900=100)	229	140	320	252	142	359

EQUIVALENT YEARS OF SCHOOLING COMPLETED

As a standard, a "year of schooling completed" is much too elastic, for the school year is now 60 percent longer than it was six decades ago. In 1900 the average daily attendance of enrolled pupils aged 5-15 was only 99 days, whereas in 1957 it had reached 159 days. Moreover, the labor force of 1900 consisted mostly of workers who had been in school when the average attendance was even less than 99 days; for example, most workers who then were 35-45 years of age were presumably in school in 1870 when the average attendance was only 78 days (this leaves aside the schooling of immigrants).

I have adopted a procedure developed by Clarence D. Long[8] to adjust the figures on school years completed for these changes in length of school attendance. It gives me comparable figures for years of schooling completed, which I have based on the 1940 experience of an average of 152 days of school attendance.

This simple adjustment for changes in school attendance alters the picture considerably. As is shown in table 2, the rise in equivalent years of schooling completed, adjusted for differences in the length of the school year, is much larger than that shown by the unadjusted figures on which table 1 is based. For the labor force, whereas years of schooling completed rose by about two-fifths betwen 1900 and 1957, the equivalent years of schooling completed became 2½ times as high in that period (rising from an index of 100 to 252). During these same years, 1900-57, the total number of years of schooling completed by persons in the labor force, on a 1940 equivalent basis, rose 6⅓ times (from an index of 100 to 638).

TABLE 2.—Equivalent 1940 years of schooling completed by the population 14 years and older and by the labor force 18-64 years of age, United States, 1900-57

Year and index 1957	Population			Labor force		
	Number (millions)	Equivalent 1940 years of schooling completed per person	Total equivalent 1940 years of schooling completed (millions)	Number (millions)	Equivalent 1940 years of schooling completed per person	Total equivalent 1940 years of schooling completed (millions)
1900	51.2	4.13	212	28.1	4.14	116
1910	64.3	4.65	299	35.8	4.65	167
1920	74.5	5.21	388	41.4	5.25	217
1930	89.0	6.01	535	48.7	6.01	293
1940	101.1	7.07	715	52.8	7.24	382
1950	112.4	8.46	951	60.1	8.65	520
1957	117.1	10.02	1,173	70.8	10.45	740
Index 1957 (1900=100)	229	243	553	252	252	638

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[8] Set forth in his study, *The Labor Force Under Changing Income and Employment*, National Bureau of Economic Research. Princeton, N.J., Princeton University Press, 1958 (see especially app. F). Professor Long has kindly made available to me his basic worksheets, which provide the adjustment factors on which my estimates of "equivalent years of school" are based.

COST AS A MEASURE OF SCHOOLING

The two concepts presented above treat a year of elementary school the same as a year of either high school or college, although they differ greatly in value. A year of high school costs 5 times as much as a year of elementary school, and a year of college almost 12 times as much. I propose to use the following 1956 price tags for a year of schooling:[2] Elementary school, $280; high school, $1,420; and college, $3,300.

Table 3 shows that in 1957 the members of the labor force had completed on the average 7.52 elementary-school years, 2.44 high-school years, and 0.64 college and university year. At 1956 prices, the cost of an average year of this composition was $723.

Two estimates were made for 1900, which are, in substance, a lower and an upper estimate of schooling and costs. In the lower estimate, high school and college education is allocated within the labor force roughly as it was distributed in the population among the comparable age groups; in the higher estimate, all of this education was allocated to the labor force. Table 4 gives the years of schooling per member of the labor force for both estimates and then the costs for the upper one. At 1956 prices the costs of an average year of schooling of these two compositions comes to $540 for the upper estimate and to $423 for the lower one.

The results of these preliminary steps in using costs to measure the stock of education are shown in table 5. It should be observed

TABLE 3.—Cost of education per member of the labor force 18–64 years of age, in 1957, according to years of schooling completed [1]

Type of schooling	Years of schooling per member, 1957	Cost of schooling per year in 1956 prices	Total cost per member [2]	
			Amount	Percent
Elementary school	7.52	$280	$2,106	28
High school	2.44	1,420	3,458	45
College and university	0.64	3,300	2,099	27
Total	10.60	[3]723	7,663	100

[1] Based on table 138 of the *Statistical Abstract of the United States 1959* (U.S. Department of Commerce, Bureau of the Census), which gives the percentage distribution by years of schooling completed for the labor force 18 to 64 years old, 1957. The elementary-school subtotal is (4×5.6)+(7×26.2)+(8×68.3)÷100=7.522; the high-school subtotal is (2.5×19.8)+(4×48.5)÷100=2.435; and the college subtotal is (2×8.8)+(5×9.2)÷100=0.636. Col. 3 is based on these unrounded numbers. It should be noted that the total years of schooling completed per member (10.60) is slightly larger than the total (10.45) 1940 equivalent years of schooling completed, shown in table 2 for the labor force, because of a small difference in the data and procedure used.

[2] Each amount is the product of the corresponding items in cols. 2 and 3.

[3] Average cost per member per year, obtained by dividing $7,663 by 10.60.

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[2] For the underlying estimates, see "Capital Formation by Education," op. cit., and "Education and Economic Growth," op. cit., p. 64. The reader should bear in mind that these estimates of costs include *income forgone* by mature students and that this component in the real costs of education is large both for high-school and for college and university education.

that table 5 is based on the upper estimate of costs for 1900. The cost of the educational stock of the labor force, thus defined, in 1957 was 8½ times the 1900 level (from an index of 100 to 849). If the lower estimate figure for 1900 is used, that is, $423 instead of $540, the stock of education in the labor force rose virtually 11 times between 1900 and 1957. The stock of nonhuman reproducible wealth (Raymond W. Goldsmith's estimates)[10] rose only 4½ times, as shown in column 5 of table 5.

TABLE 4.—Cost of education per member of the labor force in 1900, according to years of schooling completed [1]

Type of schooling	Years of schooling per member		Cost of schooling per year	Total cost per member [2]	
	Lower estimate	Upper estimate		Amount (upper estimate)	Percent
Elementary school	3.75	3.447	$280	$962	43
High school	.31	.556	1,420	790	35
College and university	.08	.147	3,300	485	22
Total	4.14	4.140	[3] 540	2,237	100

[1] These estimates are computed from a study of the high school enrollment and graduates, and also of college enrollment and graduates from 1900 back to 1850. High school enrollment represented about 0.686 of 1 percent of the population, and high school graduates, 0.351 of 1 percent. For college and university students, the 2 comparable estimates were 0.210 and 0.135 of 1 percent. Distributing all of these among the labor force of 1900, we have for elementary school (84.5×2.53) + (16.5×(8)) ÷ 100 = 3.447; high school (2×5.16) + (4×11.31) ÷ 100 = 0.556; college, (2×2.16) + (4×2.61) ÷ 100 = 0.147. The average cost per year of schooling becomes $424 instead of $540 if the lower estimate of years of schooling per labor force member is used (col. 2) both at 1956 prices.

[2] Each amount is the product of the corresponding item in cols. 3 and 4.

[3] Average cost of schooling per member per year, obtained by dividing $2,237 by 4.14.

TABLE 5.—Stock of education measured by costs and stock of reproducible nonhuman wealth, United States, 1900–57 [1]

Year (1)	Cost of an equivalent year of schooling (1956 prices in dollars) (2)	Cost of educational stock, population 14 years and older (in billions) (3)	Cost of educational stock, labor force members 14 years and older (in billions) (4)	Stock of reproducible nonhuman wealth (in billions) (5)	Percentage col. 4 is of col. 5 (6)
1900	$540	$114	$63	$282	22
1910	563	168	94	403	23
1920	586	227	127	526	24
1930	614	328	180	735	24
1940	670	465	248	756	33
1950	690	656	350	949	37
1957	723	848	535	1270	42
Index 1957 (1900=100)	134	744	849	450	191

[1] The procedure for deriving the estimates of the cost of an equivalent 1940 year of schooling shown for 1900 appears in table 4, and for 1957 in table 3. A similar procedure was used for 1940. Estimates for the rest of the years were obtained by extrapolation.

In col. 3 each item is obtained by multiplying the corresponding item in col. 4 of table 2 by that in col. 2 of table 5. In col. 4 each item is obtained by multiplying the corresponding item in col. 7 of table 2 by that in col. 2 of table 5.

Cols. 3 and 4 are based on 1956 prices. Col. 5 is derived from the work of Raymond W. Goldsmith, who kindly made available his estimates of U.S. (national) reproducible wealth at 1947–49 prices, which I then adjusted to 1956 prices.

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[10] Personal communication.

Concluding Observations

1. A comparison of the several measures presented shows how much they differ. The estimates that follow are restricted to the education of members of the labor force.

Measure of educational stock	*Increase between 1900 and 1957 Index 1957 (1900 = 100)*
I. Years of schooling completed (table 1)	359
II. Equivalent 1940 years of schooling completed (table 2)	638
III. Cost of schooling:	
(*a*) Upper estimate cost in 1900 (table 5)	849
(*b*) Lower estimate cost in 1900 (table 4), also related text	1,092
Stock of reproducible nonhuman wealth cost (table 5)	450

2. The measure, "year of schooling completed," understates greatly the increase in the stock of education that has been realized over the decades if for no other reason than that the average daily attendance of enrolled pupils rose 60 percent between 1900 and 1957.

3. "Equivalent years of schooling completed" also understates the increase in the stock of education because it does not distinguish among years of elementary, high-school, and college and university schooling; each year regardless of the level is treated the same. From an investment point of view, a year of elementary schooling costs much less than a year of high school or of college, and the latter two have been increasing much more rapidly, as the following estimates show.

TABLE 6.—Years of schooling completed per member of the labor force

Type of schooling	1900 (upper estimate)	1957	Increase between 1900 and 1957 Index 1957 (1900 = 100)
Elementary school	3.437	7.52	219
High school	.556	2.44	439
College and university	.147	.64	435
Total	4.140	10.60	256

4. Our third measure based on costs of schooling is a preliminary estimate of "stock of output capacity" represented by education. It does not distinguish between the younger and the older workers in the labor force in measuring their education; for example, a year of high school is given the same weight whether the worker is 25 or 60 years of age. There is also the implicit assumption that a year of schooling of a given level (elementary school or high school or college) acquired recently or many years ago are comparable once an adjustment has been made for differences in length of school attendance. Nor is there any allowance for obsolescence of education. Surely some instruction is better now than it was several decades ago, and also, some education is subject to obsolescence.

5. The equivalent years of schooling completed per member of the labor force have risen more for those in the younger than in the older age groups, as the following estimates make clear.

TABLE 7.—Years of schooling completed by members of the labor force, by age group, 1900 and 1957

Age group	Number of years of schooling		Increase between 1900 and 1957. Index 1957 (1900 = 100)
	1900	1957	
16-19	4.2	11.0	262
20-24	4.6	12.8	278
25-44	4.2	12.2	290
45-64	3.8	7.8	205
65 and over	3.3	5.6	170

6. Despite the greater increase in education of workers in the younger groups relative to those in the older groups, the average productive life of the entire stock of this education may not have changed appreciably. Assuming a productive life up to the 68th year of life and the same rate of deaths and disabilities for each age group, a crude estimate indicates that the average productive life of all of the education in the labor force was slightly more than 30 years in 1900 and about the same in 1957. The reason for this result seems to be the fact that young people now enter the labor force at a somewhat older age than they did in former years, mainly because they continue their schooling for more years.

7. If the above statement about the average productive life of education of the labor force proves to be approximately correct, our estimate that the stock of education in the labor force increased 8½ times between 1900 and 1957, as compared with the increase in the stock of reproducible nonhuman wealth of 4½ times takes on added significance. As I have attempted to show elsewhere, investments in education may explain a large part of the otherwise unexplained economic growth of the United States.[11]

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[11] "Education and Economic Growth," op. cit., pp. 78-82.

CHAPTER 8

Education and Economic Growth

*Richard S. Eckaus**

ECONOMIC ANALYSIS of education potentially can contribute a great deal to the understanding required for the formulation of an educational policy that will make the best use of human resources and contribute most to economic growth. Not all education, of course, has an economic motivation, but this does not preclude concentration on the economics of education.

The particular objective of this paper is analysis of the significance of higher education in economic growth. To achieve this objective, it is necessary to consider the role of education in the economy, its contribution to economic growth, and its effect on the distribution of the benefits of that growth. Many of the economic features of education can usefully be analyzed as a process of capital formation. The process and its results can then be compared with other types of capital formation in order to develop a better understanding of the special contribution of higher education to economic growth.

Thus, part I of this paper discusses an educated labor force as a productive capital factor in the economy, and its special characteristics. Part II explores the implications of this analysis for the demand for and use of college-trained manpower. The analytical approach is then extended in part III to a consideration of the conditions of supply of such manpower.

In this area of investigation, as in others, it is easier to ask questions than to find answers. However, it is also true, I believe, that the right questions about an economic policy in education have not been asked often enough and in a sufficiently specific form. When this is done, there is a much better chance of abstracting useful facts from the abundant statistics available. This paper is mainly an attempt to pose the issues of investment in education in a manner susceptible to economic analysis. It presents and discusses some methods of developing a practical basis for resolution of the issues.

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*Associate Professor of Economics, Massachusetts Institute of Technology. The research upon which this chapter is based was supported by the Rockefeller Foundation and the Center for International Studies, MIT.

I. Educated Labor as a Capital Input to Productive Processes

It may appear somewhat strained to treat educated labor even in some limited aspects as if it were a capital factor.[1] From the viewpoint of the individual and of society as a whole, however, education is similar to the production of physical capital goods. Both require the use over a period of time of facilities such as buildings, materials and equipment, and labor skills. Both necessitate the sacrifice of goods and services that might otherwise have been produced. Both will yield "services" over some subsequent period. The essential capital formation features are the same, but, of course, the conditions of "production," the time periods involved, and the resources required vary extensively. These variations, the restrictions they place on human capital formation, and their implications for growth are discussed here.

EDUCATION AS RESOURCE DEVELOPMENT

To gain an appreciation of the significance of education treated as a process of capital formation in humans, it is helpful to use an analogy with the natural resources of a nation—its farmland, mineral deposits, rivers, and so on. Virtually none of these, by themselves and unimproved, yield useful outputs. Yet after they are worked upon by men and equipment, they produce crops, ores, and power. After developmental work, natural resources become a kind of capital, each type of resource possessing some unique features, but having the same essential quality of yielding goods or services over a period of time after some initial investment of effort. There is no generic term for the developmental efforts that must be applied to natural resources to make them into productive capital, but there is such a term for efforts to develop human resources. It is "education." Over a period of time education will improve the productivity of labor and will result in services that could not otherwise be performed.

In turning to analysis of the special characteristics of educated labor as a capital factor, it will be useful to refer to the analogy with development of resources, natural and human. It is a fruitful one and worth pursuing because it helps to make appropriate the application of well-known economic concepts. For example, the amount and quality both of human and of natural resources in a society depend on their development, and these resources can never be known until they are cultivated. Investment in oil exploration and in improvement of extraction techniques will actually change the known available oil reserves. Again, land fertility is not a once-and-for-all unchangeable gift of nature. Fertilization and irrigation will increase fertility, as will development of new crop strains especially suited to the land. These will contribute to the land's economic value and even to what may be considered the total amount of arable land available. Similarly, labor skills not only are developed by education but they are found as well. It just does not seem to be true that human talent will always appear no matter how discouraging the environment and inadequate the cultivation. One of the functions of an educational system is to act as a mechanism for searching out and selecting potential talent. Thus education not only improves the quality of a labor force but also increases the amount of talent beyond what otherwise would be known. And different levels of education probably make different kinds of contributions to the uncovering of individual potentials.[3]

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[1] See Seymour E. Harris, ed., *Higher Education in the United States, the Economic Problems*. Cambridge, Mass., Harvard University Press, 1960; Paul C. Glick and Herman P. Miller. Educational Level and Potential Income. *American Sociological Review*, 21: 307–312, June 1956; Theodore W. Schultz, Capital Formation by Education. *Journal of Political Economy*, 68: 571–583, December 1960.

One feature of productive capital that is of great importance in determining its role in economic growth is the specificity of its use in the production of some particular commodity. Many developed natural resources have a wide range of applications in production, or they are applied in a wide range of industries, and accordingly have considerable mobility between industries. Fuel and other power resources are a good example of this; and so, too, are fertile, well watered land in temperate climates, and many mineral resources. They are the source of a wide range of final products. The products of some resources, however, have only a limited range of alternative uses. Potash, for example, is mainly a fertilizer, and when the processes of synthetic nitrogen fixation were developed in the early years of this century, the value of a fertilizer that had been a great natural resource of Chile was vastly reduced. A similar phenomenon is the obsolescence of physical capital due to a change in technology or to a transfer of demand from the commodity the capital produced. Generally, the greater the range of uses of the capital equipment, the less likely it is to be made completely worthless by such a change. A simple lathe, for example, which can produce rotary metal shapes for a large number of uses, is less likely to become obsolete than a complicated machine lathe that is highly specialized in its design for producing some particular part.

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[3] There is still another reflexive or feedback effect of education on the amount of human skills available—an effect that is of special importance in the economics of emerging nations. This effect makes itself felt via the relation between education and the total size of the population and of the labor force. There is no doubt that in many countries educational levels and birth rates are inversely related. However, it should be kept in mind that education may not be the causal factor in this relation, or at least not the only causal factor. It may to some extent operate only indirectly via its connection with income levels.

Generalization on the relative specificity of educated labor is difficult because of lack of organized information. Still, most human capital is probably uniquely mobile as compared with most physical capital. Certainly the range of usefulness of an elementary education in production processes is very broad. This level of education, however, is not sufficient to meet society's need for skilled and professional workers. Although education permits greater specialization, it does not limit the range of fields in which individuals may be useful in an economic way. "Education is broadening" has a vocational as well as a cultural meaning. Persons with a higher education may become "narrow specialists" but not necessarily. A lawyer's education, for example, seems to equip him for a wide range of occupations that transcend even the broad legal field. Again, the potential openings for a mechanical engineer are many and varied. It is probably true that the transferability of skills, in a very general sense, from one type of productive activity to another, is greater for college- and university-trained persons than for those in manual and technical trades; however, even in the latter there is undoubtedly a considerable transferability of competence and knowledge.[3]

There are instances in which changes in technology, or perhaps demand for the product, have eliminated the need for certain human skills, and in which human capital could not be shifted with ease from one occupation to another. Most of what has been written on the subject of technological unemployment, however, is highly impressionistic, and there have been few attempts to quantify and measure the changes that have occurred. In some of the changes that have eliminated particular types of industry and occupations as, for example, the displacement of handloom weavers by a mechanized textile industry, certain of the skills required in the new industry are the same as those in the old. Of course, fewer persons are required on account of the large increase in productivity, so a substantial obsolescence of human capital is still involved.

It is tempting to generalize that obsolescence of human skills is a greater danger at lower rather than at higher levels of skills and, in particular, that it happens rarely in professions. Certainly it is easier to think of examples of obsolescence in handicraft skills than in professional skills. Yet it does happen in professions also. There are physicians whose specialties have become less in demand as a consequence of development of new drug therapies. And certain fields of engineering have lost much of their former vogue, in part owing to changes in technology or in demand for particular products.

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[3] The distinction between general education and occupational training is, in part, a distinction as to whether the studies prepare for further education but the distinction has another sense as well. It also refers to the specificity of the skills created. Though occupational training is most commonly used to describe the development of skills in particular vocations, much of higher education is also training for an occupation.

HUMAN VERSUS NONHUMAN CAPITAL

Of all the features of human capital that distinguish human capital from physical capital, the most significant are the "noneconomic" factors or motivations.[4] Individuals do not go to school and college merely as the result of a calculation of the rate of return achievable. Certainly a basic education is commonly regarded as an absolute prerequisite for the achievement of personal, noneconomic goals by the individual and his guardians. Higher education is also heavily overlaid with "noneconomic" motivations, though perhaps not as much as is sometimes assumed in the discussions of the value of a liberal arts education, for example.

Likewise, though employers hire workers mainly on the basis of an economic calculation that takes skills and education into account, the calculation is usually not the only factor in making the contract. As far as the *hirers* of educated labor are concerned, the noneconomic motives, to the extent they operate at all, are probably more significant for the more highly educated workers than for workers with only an elementary school education.

Many, though not all, of the noneconomic aspects of education can be summed up by the economist as follows: Education is like a consumer good as well as like the investment process. Economists do not inquire deeply into why the tastes of consumers are what they are, but take them as more or less given patterns, which, along with incomes and prices, determine the actual purchases. In a similar way it is possible to concentrate on the implications of noneconomic factors in the education process. A few examples will illustrate the point.

In many societies education has a prestige or a social value that is independent of its economic significance. As obvious examples: in Burmese, Jewish, and early New England societies religion constitutes a primary motive for education to the level of literacy; the individual is expected to be able to participate in religious activity through his own reading. As a less obvious but important example, one might cite the increase in students specializing in the sciences in recent years and the relative decline in applications for admission to medical schools. Yet the medical profession remains at the top of the income heap. The prestige of the scientist is reflected not only in the pursuit of scientific education by students but in the hiring policy of business. Industrial research has been profitable, but it is also true that scientific research manpower has been hired and hoarded by some businesses in a way that cannot be explained by economics alone.

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[4] This terminology could be interpreted either as an understatement or as the reflection of gross pretentiousness on the part of the economist, as it lumps together in a residual class all manner of influences that rank high on anyone's scale of values. Yet it only reflects the economist's way of organizing the relevant influences to bring them within the scope of his analysis. These noneconomic factors must be taken into account and their economic significance analyzed. The most convenient way to do it at this stage of knowledge is to consider them together.

Noneconomic factors are by no means entirely absent from decisions on physical capital investment: to be sure, there are fads and fashions there as well. However, the noneconomic features of physical capital are seldom presented as the main justification of its existence, as is often true in regard to education. The calculations may not be precise and there may be biases in selection, but the major criterion for private investment in physical capital is economic, not esthetic, nor religious, nor any other. Public investment in physical capital is another matter; the motives for this public investment may be quite similar to the motives for sponsorship of public schools.

Two essential features of labor as a factor in production tie the noneconomic aspects of education closely to its economic aspects. First, labor's qualities as a productive input cannot be divided and used separately. A man is a man, and when he works with a spade or a machine he is also a citizen, a member of a family, a little bit of an enterpriser, and so on. The education he acquires in, and for, any one role in which he functions is also applied in some degree in every other role. Put another way—the economic role of education in the preparation of skills for use in production cannot be fully separated from its consumption features. The education and skills obtained as consumer goods may not be distinguishable from those obtained as investment in capital. This also means that the income of labor is not and cannot be fully distinguished between returns due to native ability, unskilled effort, family and cultural indoctrination, or the various types of formal education that have been acquired. In this respect individuals in their acquisition of education are like small proprietors whose business fortunes are not separable in law from their personal fortunes.

The impression is not intended that all the noneconomic aspects of labor can be summed up and analyzed as if they constituted simply another consumer good. Opportunity for social advancement is a private and also a public consumer good, and considered as a public consumer good it is a most unusual one. Since social advancement is related to income, it is associated with investment in education, but it does not depend only on economic achievement.

A second unique feature of labor is its inalienability; more bluntly, people cannot sell themselves. This means that the viewpoints of the individual and of society are going to be different from the viewpoints of firms hiring labor. Firms pay for and use the flow of labor services resulting from the formation of human capital by education, but they are not primarily concerned with that capital-formation process itself. They may train workers if there is no other way of getting the services they need, but if they do provide training, they need to realize that they cannot be sure of fully recapturing all the benefits of that capital-formation process. It is, of course, no reflection on business firms that their point of view does not correspond with that of the workers nor with an overall vision of society. Permanent vesting of control and "ownership" of his labor in an individual means, among other things, that there can be no guarantee that his motives and incentives will be identical with those of the business firms for which he works or of society as a whole.

Allied to inalienability are the restrictions in a free society, especially, on the means which can be used by society to recapture for general use the benefits of investment in the education of individuals. For example, persons trained by one of the military services may be required to devote a specific minimum time to that service. The more general obligations of citizens for the education received are not well defined, partly because the general social benefits of education also are not well defined.

Education has so far been considered in terms of its ability to reproduce skills and thus form human capital as a consumer good and as an instrument of social policy. It is more than this; it can create the potential for finding new goods, new technologies, and new instruments of social policy. No other kind of capital formation has all these features.

It is useful within the scope of economic analysis to consider education as if it were a process of creating human capital. It is more than that, to be sure, and the economic analysis of this aspect of education is not intended to deny its other aspects or even to reflect on their comparative significance. The purpose of this section has been to describe in a general way the features of human capital that set it apart from physical capital. These require special attention and accommodation of conventional economic theory as the analysis proceeds to a consideration of the specific demand-and-supply factors for human capital.

II. The Educated Labor Required for Economic Growth

Education can be the equivalent both of a consumer good providing personal satisfaction and an investment good that contributes to the production of other goods and services. In considering this latter aspect of education, we now ask questions similar to those conventionally asked about physical capital and economic growth: Is our rate of investment in human capital, that is, in education of persons, adequate if we want to accelerate our rate of economic growth? Is it even adequate to maintain our present growth rate? Is the present composition of this type of investment the optimal one? That is, is the system producing engineers, mathematicians, physical scientists, doctors, and teachers, of various types in the proportions that are most effective in aiding our economic growth? Recent developments in the world abroad that have disturbed the complacency of the United States, as well as domestic pressures such as those due to our population surge, have increased the urgency of such questions. Since the preparation of this volume is in part an expression of this newly increased concern, we need not delve further into its sources.

However, such questions are also being asked in the less-developed nations of the world, perhaps with even greater urgency. These nations start from much lower income levels and are under great pressure to improve their economic performance. There is less leeway in their systems since they have very little of any type of educated labor and other resources and therefore they can less afford mistakes.[5]

These questions differ from the more common ones. Usually they are posed in such terms as: "Shall we spend more on education? Shall we subsidize medical education? Make loans for college education?" Such questions do not specify the objectives of the proposals and thus do not provide or imply a criterion for decision. There are a variety of possible objectives. Economic growth and equalization of opportunity are two such. It is likely that these are not strongly competing objectives, but that is not at all certain, and situations may arise in which they do compete.

Moreover, these latter questions do not recognize another possibility: that there may be more than one set of combinations of investment in physical capital and human capital via education, which would satisfy the requirements of a particular growth rate. Thus, the fundamental economic criterion must be kept in mind; namely, that the optimal combination of the investments required to achieve a certain growth rate in the combination which requires the least sacrifice of consumption (including that education which is a consumer good). It is not because sacrifices are to be avoided at all costs that the criterion is posed thus, but rather because there is no way in which they can possibly be avoided, and they should be minimized. Education, like any other activity, uses productive resources; some types of education require more resources than other types, but in any case the more education, the greater the resource requirements. Many of the resources used for education can be devoted to other purposes, and there is a good deal of possible switching between types of education. Resources for education, and for all other types of activity, are not unlimited: in any year there are just so many. If economic growth proceeds, there will be more resources in the future but never an unlimited amount. Therefore, diversion of resources to provide more, better, or different types of education means that some other type of economic activity will have to be sacrificed. The sacrifices may be only of potential output or satisfaction, but that does not make them the less real and important. This is true even when there is some unemployment of resources, as in a recession, because there is always some choice as to how the resources may be reemployed and, if one line of activity is chosen over another, the second is sacrificed. One has only to follow closely the politics of various antirecession measures to realize how well the various economic interest groups realize that this is no abstraction as they maneuver for a preferred position.

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[5] The questioning of educational objectives has also led to a new concern with educational methods. This is an area that this chapter will not attempt to enter.

This reasoning points up the inadequacy of educational policies based on the maxim, "the more the better." In a full-employment economy, having more of investment in education generally means giving up some amount of something else. Anyone is entitled to the opinion that society *ought* to give up some of its other consumption or investment in order to have more investment in human capital, and the relative wealth of the United States may suggest that such sacrifices are "easier" in the United States than in other countries. Unless such opinions are based on a careful evaluation and balancing of the alternative ways of achieving economic growth, however, they can have no other status than that of personal, normative judgments. Education considered as an investment in human capital is a way of achieving economic production and must be considered as such and balanced against other ways. This approach does not imply a narrow view of the economic contribution of education—a view that leaves out the role of higher education, especially, in creating the basis for finding new knowledge and developing new products via research. Such functions cannot easily be brought within the operating framework of decisions about education, but they should not be ignored, and it is not intended here that they should be.

The inadequacy of the maxim, "the more the better," on which so much discussion of educational policy seems to be based, is perhaps most clearly demonstrated in practical decision making—from local school boards through State boards of education to the Federal Congress. Policy decisions are contrained by limited resources—resources that must be spread among such projects as welfare work and highway construction. It is important for people to have opinions as to whether all or part of these expenditures should be aimed in a particular direction. But again the question finally must be asked, "How much?" taking into account the alternative investments possible.

THE LOGIC OF EDUCATIONAL POLICY DECISIONS

The logic of the requirements for investment in education for economic growth is the same as the logic for investment in physical capital. It is easier to describe than to implement. A statement of this logic, however, will provide the criterion by which to judge partial policies or rules of thumb to determine if they are at least influencing decisions in the right directions.

Growth by itself is not an adequate specification of an economic goal, for growth can take many forms and encompass different combinations of outputs of consumption goods and investment goods of various types. These different combinations may in turn entail different patterns of inputs of productive resources of various types, including both physical and human capital. Thus, logically, before one can begin to discuss the question of optimum combinations of these inputs and therefore of the requirements for them, the targets of the growth must be specified in terms of the relative increases desired in the outputs of the various sectors. It must also be kept in mind that the targets themselves are not invariant to resource availabilities and possible combinations. These latter two factors will determine the relative cost of reaching various targets, and there is some substitution between them on a cost basis, just as the consumer decides between meat and cheese according to their costs.

There is another type of information that is essential for making decisions on the amount of resources that should be directed toward education to form human capital. This is information about what economists call "production functions": the ways in which materials, physical capital, and human capital can be combined to reach production targets. Essentially it is information about technology in a very general sense. It requires quantitative knowledge about all the inputs for the various outputs. This includes data on the productive resources, human and otherwise, required for the formation of human capital by means of education and of physical capital of various types, as well as of consumer goods. Of course, the questions about the relative mobility of human and physical capital raised in part I of this chapter would also have to be answered.

Given all these kinds of information the economist can visualize a grand synthetic program which results from an optimizing procedure subject to the technological and other constraints described. This program would then specify the optimal amounts of education of various types which should be given, just as it would specify the optimal rate of investment in the different types of physical capital and the best use of natural resources. Educational policy would emerge as just one other aspect of an overall economic policy.

Perhaps it is not even necessary to explain why this grand, dynamic, synthetic program cannot be implemented. Yet it may be useful to underscore the fact that our inadequacies in formulating educational policy for investment in human capital are of the same kind as we would have in formulating an investment policy for physical capital. The technological and consumer information required for that grand program just does not exist and most of it cannot be obtained except at high cost. Moreover, on account of the scope and the complexity of the interrelationships, it would be quite impossible, with all the constraints involved, to solve the huge problem.

The problems may be more obvious if viewed in relation to those of the less developed countries that do undertake to formulate consciously and explicitly an investment policy not only for the public sector but at least as a guideline also for the private sector. In the United States the primary public investment is investment in education; physical investment planning is left mainly, though not exclusively, to the private sector. (Of course, investment in education in this country is by no means an exclusively governmental activity.) The less-developed countries are trying to improve themselves economically as quickly as possible in the face of pressing resource scarcities. Thus they are vitally concerned with doing as well as they possibly can in the formulation of comprehensive, optimal physical investment programs. They do not completely succeed, owing to the analytical and data problems mentioned earlier. They "make do" with approximative, rule-of-thumb procedures, as we must in formulating a policy for investment in education.

METHODS OF APPROXIMATION

The approximative procedures that economists have developed enable them to know something about the characteristics of that grand synthetic program. Experience has indicated that it is possible to develop rough but useful guidelines for physical-investment programs. The next step is to compare the use of such approximative procedures when applied to the problems of the requirements for human capital to determine what information and guidance the procedures might yield.

One method in use is to estimate the returns due to investment in education and compare them with the returns elsewhere in the economy.[6] Since an optimal policy in a perfect market would direct resources where the returns are highest, such a comparison might be expected to indicate whether more or less of the various types of educational investment should be undertaken. Unfortunately, there are many difficulties in applying the method. One of the most serious of these is the inability to estimate *all* the returns attributable *only* to the education that contributes to economic production. Wages and salaries are certainly not entirely adequate for this particular purpose. This suggests that there is a serious problem in drawing conclusions from such studies; what may be true for an individual, as far as the "profitability" of investment in education is concerned, is not necessarily true of society as a whole. Nonetheless the method should be developed further and refined for the light it can throw on the problem so long as the conclusions derived are presented with appropriate care.

One of the most common and most powerful methods used by economists in determining overall physical capital requirements for growth is the application of ratios of marginal capital requirements to prospective increases in outputs. Many studies have been devoted to the development of these ratios; and in the hands of an experienced economist, aware of all the inadequacies of the tool, such capital-output ratios can provide order-of-magnitude estimates that might otherwise be impossible to achieve.[7] The ratios have a number of serious faults, which must be taken into account. Aside from many difficult accounting problems that make their use suspect, they are calculated on a historical basis and accordingly reflect a particular past composition of output and of patterns of investment undertaken. Since change in these patterns is usually one of the objectives of growth, the use of historical ratios creates a bias in the results. There are also such problems as adjustment for less than full utilization of capacity, and for the changing importance in different years of additions to existing plant and equipment and of completely new installations.

A rough adaption of this method, comparing trends in enrollment and openings in the professions, is used by Harris in coming to his conclusions about the dangers of "overeducation."[8] This method, however, again fails to distinguish between the various functions of education and assumes that all such education is only for the economic purpose of creating the optimal amount of human capital. Yet it is possible that further work in this direction will eventually also pay off.

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[6] See Gary S. Becker. Underinvestment in College Education? *American Economic Review*, 50: 346-354, May 1960 Papers and Proceedings. American Economic Association.

[7] See P. N. Rosenstein-Rodan. *International Aid for Underdeveloped Countries*. Center for International Studies, Massachusetts Institute of Technology, Cambridge, Mass., January 1961.

[8] Seymour E. Harris. *The Market for College Graduates*. Cambridge University Press, New York and London, 1949.

ORIGINAL INVESTMENT COST OF EDUCATION

Only recently has an estimate appeared of the capital formation by education, prepared by Schultz, which undertakes to quantify the investment in education.[9] His estimate has a number of conceptual difficulties both in concept and in measurement.

In such estimates the "opportunity costs" to society of educating students must be taken into account. These costs are the opportunities for output and income that are forgone by society when individuals, instead of entering the labor force, remain students. Such costs are naturally greater at the higher levels of education than at the lower. In computing these, some careful "social accounting" must be done. Schultz estimates the opportunity costs essentially by computing the average returns attributable to the lost hours of work of a typical student. He recognizes the potential criticism that the method is a "partial equilibrium" approach, which does not take into account the alternative effects of a wholesale transference of school-age workers into or out of the labor market. However, Schultz claims that his *is* only a problem of a shift on the margin of a typical worker. But an estimate of capital stock in education on this basis cannot be used to estimate the changes in total output due to a radical change in the number of students enrolled in schools and colleges.

Nor should the total forgone earnings necessarily be used to estimate the opportunity cost to society of the years spent in education. The earnings loss is not even a true estimate of the differences in total national income that are due to the withholding of labor from the working force. What also must be taken into account is the possible return on the savings which might have been generated if additional income had been available to the family. The different levels of consumption that might otherwise have been maintained need also to be taken into account. Perhaps no better estimates could have been made concerning the period in which data are available, but it raises doubts about comparability of the estimates for different points of time if the basic behavior patterns have changed and the estimating procedure has not.

Though Schultz recognizes that a part of the education given and received is really a consumer good, he does not separate that part from the total capital formation by education. It might be argued that even though there is some education that is essentially used as a consumer good, it could yield productive services just as the education intended primarily to form productive human capital does. Therefore it, too, should be added to the capital stock created by education. This addition would be hard to justify, however, in the face of the well known differences in the returns from various kinds of education.

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[9] Theodore W. Schultz. Capital Formation by Education. *Journal of Political Economy*, 68: 571-583, December 1960.

There is a serious omission, however, in the failure to take account of that type of education which usually comes under the "vocational" heading. Only part of this is given in schools, public or private, and, therefore, it is in general not recorded by Schultz's statistics. Yet no one would argue that vocational education is not a significant type of investment in human capital. Much of such education is obtained through more or less formal on-the-job or apprenticeship training programs, and the training acquired in even more casual ways still has an effect. So, on the one hand, Schultz's estimate includes a certain amount of consumption services, and on the other, excludes a certain amount of what undoubtedly is productive of human capital.

Finally, the approach adopted by Schultz, starting from the side of the education which is "given" to students, assumes implicitly that all such education is used. As a matter of fact, not all the members of the student population, even in the working-age groups, are potential members of the labor force or would be in the labor force if they were not in school. This applies particularly to girls. However, it is to some extent true of all students for several reasons. It was pointed out in part I of this paper that education itself is not the only function of an educational system. It also serves as a selection and placement device, and in performing these functions "gives" education that is not used. For example, in the process of becoming a lawyer, a student may first become an engineer in a college career which turns out to have been a means of deciding *not* to become an engineer. Still, it might be argued that this is part of the education necessary to make him a lawyer. There are other and cheaper ways of selecting and placing students, to be sure; but some use of education for this purpose may be inescapable.

It is clear that not all students in the labor force use the maximum amount of education that they receive; some human capital is unemployed. Some educational systems just make mistakes, though when they do it is not only, perhaps not even primarily, the fault of the educational system itself so much as a characteristic of the culture in which it is embedded. Good examples of this point are provided by the educated unemployed in some of the less-developed countries of the world: classics scholars who cannot find jobs or who become petty clerks in the midst of a dearth of human capital with technical skills. In the United States, when teachers leave their profession to take jobs for which they do not need all the skills they have acquired, we have another example of the unemployment of human capital.

REPLACEMENT COST OF EDUCATIONAL CAPITAL

There is another approach to the estimate of human capital and the economy's requirements for growth, which can be described here though results are not yet complete.

Underlying the concept of human capital is the notion that there are specific requirements for educated labor for economic production, and that changes in the composition and availability of this capital affect growth rates. This, in turn, suggests that a careful examination of production processes would reveal the number of workers with different amounts of education required to operate the processes in combination with materials and capital equipment. This is simply an application of the idea mentioned above that there are production functions for the various components of the national product that indicate the outputs which can be achieved by alternative combinations of inputs. Conventionally in economics all workers are treated as homogeneous or equal inputs. When considering the economic requirements for education, it is necessary, however, to distinguish the different types of workers in terms of their different amounts of education, including vocational training. Only disaggregation of jobs into educational categories will reveal whether there are substitution possibilities between such types of labor.

It would be extremely useful for many purposes if complete descriptions of production functions were available, with the alternative disaggregated inputs of labor and the different amounts of education specified, along with other factor requirements.[10] Unfortunately, nothing approaching this detail exists, and in those few lines in which studies of production functions have been made, the specification of labor inputs according to educational level requirements is quite incomplete. In the overall interindustry-economics research program of the Federal Government, sponsored directly by the Air Force, some detailed studies were made of manpower requirements by industry. These studies specified labor requirements by job type and by industry. They did not, however, explore the educational requirements of the different job types, nor take into consideration the substitution possibilities among workers with different amounts of education and other types of resource inputs. The customary assumption in such input-output studies is that there are in fact no such substitution opportunities.

It would be possible to specify the present educational *requirements* of the labor force in detail if all the following information were available: (1) a complete listing of jobs by occupational cate gories, and (2) a description of each occupational category in terms of the educational levels required, on the average, for that job. It would then be possible by running through all the jobs and the employment in each to classify all types of employment at the various educational levels. This would then indicate not what education the labor force had actually received, formally or informally, but what was *required* to operate the economy. If the costs of the education of the various types and levels could be ascertained, it would then be possible to formulate an estimate of the human capital employed in the U.S. economy. This would correspond to an estimate of "replacement cost" of the educational investment in people. Such a formulation would omit the education that was obtained essentially as a consumer good solely for the personal satisfaction received. It would omit also any unused education. If the objective were to provide a basis for estimating the marginal technical *requirements* for education to meet an expansion in the economy, these omissions would be desirable. However, this approach would also omit the amount of education that has to be provided in the performance of the searching and selection functions described above. It also would omit the educational requirements for that component of the population which is not counted as part of the labor force but which, to a great extent, is responsible for the effectiveness of the labor force: housewives. On the other hand, it would include vocational as well as "general educational" requirements.

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[10] See Richard S. Eckaus. The Factor Proportions Problem in Underdeveloped Areas. *American Economic Review*, 50: 642–648, May 1960 Papers and Proceedings, American Economic Association.

The basic data requirements specified above can be met only in part for the U.S. economy, but the results mentioned above can be approximated from the available data. The propulation census provides some information for an occupational distribution by industry.[11] In 1940, for the first time, and again in 1950, some reasonably detailed data on occupations were collected in this census. It is not an ideal source by any means, since responses are recorded from persons who may have no precise idea of their job category and industry classification and may tend to inflate the job description in any case. Unfortunately also, the job classifications used in the census provide only a limited amount of detail for large parts of the employment in many industries, yet no other comprehensive occupational distribution of the labor force is publicly available.

A description of the educational levels required on the average in various jobs is provided in an impressive compilation of information, *Estimates of Worker Trait Requirements for 4,000 Jobs as Defined in the Dictionary of Occupational Titles.*[12] Again, however, this

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[11] U.S. Bureau of the Census. *Occupation by Industry, 1950*, Population Census Report P-E No. 1C.

[12] U.S. Department of Labor, Bureau of Employment Security, U.S. Employment Service, 1956.

SCALE OF GENERAL EDUCATIONAL DEVELOPMENT

State of development involving *capability* to function immediately in *one or more* of the following ways:

Level	Reasoning development	Mathematical development	Language development
7	Apply principles of logical or scientific thinking to a wide range of intellectual and practical problems. Deal with nonverbal symbolism (formulas, scientific equations, graphs, musical notes, etc.) in its most difficult phases. Deal with a variety of abstract and concrete variables. Apprehend the most abstruse classes of concepts.	Work with a wide variety of theoretical mathematical concepts and make original applications of mathematical procedures, as in empirical and differential equations.	Comprehension and expression of precise or highly connotative meanings, as in— *Journal of Educational Sociology.* *Scientific Monthly.* Works in logic and philosphy, such as those of Kant, Whitehead, Korzybski. Literary works, such as those of Stein, Eliot, Auden.
6	Apply principles of logical or scientific thinking to define problems, collect data, establish facts, and draw valid conclusions. Intrepret an extensive variety of technical instructions in books, manuals, mathematical or diagrammatic form. Deal with several abstract and concrete variables.	Make standard applications of advanced mathematics, as differential and integral calculus.	Comprehension and expression as of— *Saturday Review, Harper's.* *Scientific American.* "Invitation to Learning" (radio program).
5	Apply principles of rational systems[1] to solve practical problems. Interpret a variety of instructions furnished in written, oral, diagrammatic, or schedule form. Deal with a variety of concrete variables.	Perform ordinary arithmetic, algebraic, and geometric procedures in standard, practical applications.	Comprehension and expression as of— *Popular Science.* "America's Town Meeting of the Air" (radio program).

4	Apply commonsense understanding to carry out instructions furnished in written, oral, or diagrammatic form. Deal with problems involving several concrete variables.	Make arithmetic calculations involving fractions, decimals, and percentages.	Comprehension and expression as of— *Reader's Digest.* *American Magazine.* "Lowell Thomas" (radio program).
3	Apply commonsense understanding to carry out detailed but uninvolved written or oral instructions. Deal with problems involving a few concrete variables.	Use arithmetic to add, subtract, multiply, and divide whole numbers.	Comprehension and expression as of— Pulp detective magazines. Movie magazines. Dorothy Dix. Radio "soap operas."
2	Apply commonsense understanding to carry out spoken or written 1- or 2-step instructions. Deal with standardized situations with only 1 or 2, very occasional, variables entering.	Perform simple adding and subtracting.	Comprehension and expression of a level to— Sign name and understand what is being signed. Read simple materials, such as lists, addresses, and safety warnings. Keep very simple production records.
1	Apply commonsense understanding to carry out very simple instructions given orally or by demonstration. No variables.	None	No speaking, reading, or writing required.

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[1] Examples of "principles of rational systems" are: bookkeeping, internal combustion engines, electric wiring systems, house building, nursing, farm management, ship sailing.

SOURCE: Reproduced from "Estimates of Worker Trait Requirements for 4,000 Jobs as Defined in the Dictionary of Occupational Titles," U.S. Dept. of Labor, Bureau of Employment Security, U.S. Employment Service, 1956. p. 110, 111.

publication provides only an approximation of the data desired, since it merely estimates the length of training required on the average for effective performance in a particular job category. For each job it does distinguish the specifically vocational and the general education requirements. Yet the specific vocational training period cannot be easily translated into conventional school years.

Likewise requirements concerning general educational development are described generally in terms of levels of language and reading skills, mathematical competence, and general reasoning ability. These levels cannot be easily translated into units comparable to conventional school years.

In spite of the limitations of the data and the problem of translation, the method provides facts about a description of educational requirements which is not otherwise available. The data, moreover, are closer than any other to the type of data that would enable the economist to stipulate the inputs of human capital in production processes in the U.S. economy. Though the method can be applied now only for the census years, it is the approach that would be used if the technology of all production processes could be described in terms of the alternative amounts of the various required inputs for specified outputs.

In comparing the data for the different census years, it should also be kept in mind that the differences observed are the results of movements among jobs. The method used involves the assumption that a particular job required the same vocational skill and general educational requirements in 1940 and in 1950. No allowance could be made for upgrading of jobs between 1940 and 1950; all that could be measured was the effect of movement between jobs. However, it seems reasonable to assume that this is less significant at the college level than at lower job and educational levels.

Tables 1 and 2 show overall results of the comparison. The requirement for higher education to reach the specified levels for general educational development is limited to a small fraction of the labor force, and this fraction did not change much between 1940 and 1950. In 1940 it was 6.9 percent of the labor force; in 1950 it was 7.5 percent.

Not all of the longer specific vocational training periods can be identified with higher education, though many, and particularly those running over 4 years, usually can. These latter involved only 3.3 percent of the labor force in 1940 and 4.2 percent in 1950 (table 2). Some parts of the vocational training periods of from 2 to 4 years also represent college preparation, but these cannot yet be distinguished from long apprenticeship and similar programs. In any case these percentages should not be added to the percentages requiring a college education for general purposes. There is a great deal of overlapping in the sense that a job requiring a college education as vocational preparation is very likely to require a college education for general background as well.

It is notable that there was a general upward movement of the amount of education required of the labor force in both general background and specific vocational factors. The average schooling required of the labor force for general background was 9.7 years in 1940 and 10.1 years in 1950 (table 1), and the average years of specific vocational education required was 1.26 in 1940 and 1.35 in 1950. These figures provide a basis for comparison of the relative significance of general education and of specifically vocational education in the preparation of the labor force. Altogether then, in 1940 a worker was required to have had, on the average, 11.0 years of both general and specifically vocational education; by 1950 the requirement had risen to 11.5 years—an increase of less than 5 percent.

TABLE 1.—Educational requirements, labor force, United States, 1940 and 1950

Educational level		Labor force			
Scale of general educational development [1]	School grade equivalent [2]	1940		1950	
		Number	Percent	Number	Percent
Total		44,851,060	100.00	55,086,480	100.00
1	0	583,240	1.30	119,220	0.22
2	4	3,478,758	7.76	3,118,640	5.67
3	7	8,778,560	19.57	9,067,170	16.48
4	10	19,254,962	42.93	24,584,300	44.63
5	12	9,597,940	21.40	14,019,460	25.45
6	16	2,313,240	5.16	2,775,180	5.05
7	18	841,420	1.88	1,322,510	2.40
Average years of schooling required		9.7		10.1	

[1] For explanation of this scale, see "Estimates of Worker Trait Requirements for 4,000 Jobs as Defined in the Dictionary of Occupational Titles," U.S. Department of Labor, Bureau of Employment Security, U.S. Employment Service, 1956, pp. 110-111.

[2] These figures represent personal judgments about the average amount of conventional schooling required for the corresponding general educational levels. This is obviously a somewhat controversial matter and the advice I have had in translating the scale of general educational development has been conflicting. I do not offer this translation as a definitive one.

Totals may not add because of rounding.

TABLE 2.—Specific vocational training requirements, labor force, United States, 1940 and 1950

Specific vocational preparation range	Labor force			
	1940		1950	
	Number	Percent	Number	Percent
Total	44,851,060	100.00	55,086,480	100.00
1. Short demonstration only	644,875	1.44	256,980	0.47
2. Anything beyond short demonstration up to and including 30 days	7,488,960	16.70	11,544,540	20.95
3. Over 30 days up to and including 3 months	5,934,798	13.23	4,249,320	7.71
4. Over 3 months up to and including 6 months	10,271,960	22.90	13,055,320	23.71
5. Over 6 months up to and including 1 year	1,941,740	4.33	2,785,080	5.06
6. Over 1 year up to and including 2 years	7,865,902	17.54	7,919,520	14.37
7. Over 2 years up to and including 4 years	9,210,585	20.53	12,957,350	23.52
8. Over 4 years	1,495,240	3.33	2,318,370	4.21
Average years of training required	1.26		1.35	

Totals may not add because of rounding.

Another way of assessing the significance of higher education in the training of the members of the labor force is in terms of the number of years of schooling it involves, as compared with the total years required for their general education. In 1940 higher education accounted for only 3.2 percent of all the required years of schooling; in 1950 it was 3.4 percent.

A still more significant economic assessment of the relative significance of higher education in providing the general background required for the labor force is obtained by estimating the total costs of such education relative to that of the other educational levels. This in turn requires an estimate of the costs per student of the different levels of education. Actually only the relative costs per student are important for the present purposes. The problem of estimating opportunity costs was put aside, and direct resource costs as estimated by Schultz were divided by the number of students at each educational level. The costs of schooling at the elementary school, high-school, and college levels computed in that way were in 1940 related in the ratio 1 : 1.9 : 5.8, and in 1950 in the ratio 1 : 1.9 : 4.2, indicating, by the way, a relatively lower rate of increase in the cost of inputs into college education. This helps explain why, in terms of direct resource costs, the costs of higher education required for the labor force would have been 14.2 percent of the total resource costs in 1940, while in 1950 they would have been only 11.0 percent.

Finally, the required amounts of higher education can be at least partially compared with those actually possessed by members of the labor force. From the 1940 and the 1950 census of population, the number of employed persons in those years with 4 or more years of college was computed at 5.9 percent and 7.4 percent of the employed labor force. The requirements for general education (table 1) were 7.1 percent and 7.4 percent of the employed labor force. This indicates that in 1940 some members of the labor force whose jobs required the equivalent of a college education did not have it, and that in 1950 the requirements and actual amounts in the employed labor force matched very closely.

The results are not independent of the data sources, and there may have been systematic overvaluation or undervaluation of the job requirements in the U.S. Employment Service ratings; it is likely that there were systematic upward biases both in descriptions of occupations reported and in educational attainments. Taking all these into account, it is nonetheless useful to find that as yet there is little nonuse of undergraduate or graduate college education among the members of the employed labor force. Two points hardly suffice to define a trend, so the change from 1940 to 1950 cannot be extrapolated.

The point of this presentation is not to give a full picture of the requirements for higher education and the role it plays in the economy, but to demonstrate a method of analysis. The study presented here is a historical one and the results described are highly approximate, but the approach can be developed into a method for estimating current requirements for an expanding economy. Though certainly imperfect, the method can provide a more concrete basis for educational policy than any heretofore available. However, the method tells us little about many pressing contemporary issues concerning requirements for higher education, including: "How much higher education should be directed toward the training of persons for research and development?" This problem has been alluded to above. One of the major difficulties here is in answering the prior question: "How much research and development should there be?" Its outputs are chancy, but possibly very great, and the costs in education high. No entirely conventional approach seems feasible. It will always be a decision shrouded in uncertainty.

III. Conditions Related to Supply of Human Capital

This section will analyze the economic motives for acquiring education, that is, the conditions underlying the formation of human capital to be used in production processes. As was mentioned before, there is a distinction between the educational process, on the one hand, and its outputs, educated labor or human capital, on the other. This section does not deal with the economics of the educational process itself, as, for example, with the allocation of resources between teachers' salaries and equipment.

THE INDIVIDUAL'S CALCULATION

The question for physical capital analogous to that with which we are concerned here would be: "What are the determinants of investment policy, given the technology and market conditions?" The issue as faced by the individual or the family, though seldom considered solely in these economic terms, is: "Should the expenses of additional schooling be undertaken or should the potential student go to work instead and the funds saved or used for additional consumption?" The way questions of this sort are answered must be understood because the actual amount of human capital used depends not only on the requirements or demands arising from technology and the patterns of production but also on the conditions that affect the supply of labor. In the same way the physical capital actually used in an economy depends not only on the investment opportunities but on the amount of savings and of foreign investment that goes on.

The noneconomic influences in these decisions were mentioned in part I above. They should be recalled here since education obtained for noneconomic reasons is often indistinguishable from that obtained from economic motives, and therefore substitutable for it. In the United States and many other countries, expenditures for education rise with income. It is difficult to say how such expenditures behave as the cost of education changes. As between countries the amount spent for education of different levels may vary with no precise relation to income because of essentially different preferences for this kind of consumption good. This paper is concerned with the formation of human capital, however, and therefore the discussion centers on the demand for education for this purpose.

A rational calculation by a family or an individual as to whether to invest in more education would take into account the following items:

(1) The wage income forgone—the amount that could otherwise be earned by the student if he were not engaged in schooling.

(2) The interest income forgone or the consumer satisfaction lost through the amount of money to be paid out as a direct or indirect cost of the education.

(3) The differential in future earnings between income received by a person with additional education and income as it would have been without the additional education.

The first task is to inquire how these calculations look to an individual or a family for different levels of education at different levels of income. The second one is to find whether there are likely to be significant variations between the decisions made by individuals and decisions that are optimal for society as a whole.

Compulsory attendance laws in many places eliminate the need for individual or family decision-making about some levels of education. In this matter the State in one way or another decides what is "right" for its citizens. Of course, not all countries have or can enforce compulsory attendance laws. The lower the level of family income, generally the more significant the loss of any income forgone if a member of the family goes to school, and therefore the greater the difficulty of enforcing the laws. In economies in which the opportunities for advancement through acquiring experience and skill are limited, this forgone income rises with age but levels off at the point where the individual achieves maturity as an earner. One effect of economic growth is to increase the amount of income forgone by study and therefore to discourage individuals from investing in education. The effect of larger opportunity costs probably is more important for upper rather than lower age groups. The same reasoning applies to the interest income or consumer satisfaction that is forgone owing to expenditures on education.

However, one would expect that the significance of differences in income resulting from education would be greater at low income levels than at higher levels. The "discount factor" applied to higher future incomes might vary in a similar way.

As among the different levels of education, it is probably true that the effects of inadequate knowledge and the estimates of the risk involved in undertaking more education have more impact at the higher rather than at the lower levels of education. The relative infrequency of higher education and lack of experience concerning its income effects probably combine to make its payoff seem more uncertain than the return on lower levels of education where the skills learned are more obvious and better known.

DIFFERENCES BETWEEN THE INDIVIDUAL'S AND SOCIETY'S CALCULATIONS

Even such a brief appraisal suggests the following significant aspect of investment in human capital: The calculation of its worthwhileness or profitability is likely to be quite different for individuals and for society as a whole. The difference between individuals' and society's calculations is due in part to what economists call "external economies"—effects on incomes which are not transmitted through the price system and therefore not calculable from it. For example, it is quite possible that even minor improvements in production methods that do not require professional engineering skill to develop are more likely to emerge from a group of workers with a high-school education on the average than from a group with only an elementary-school education. This clearly would be a reason for society to invest in further education. However, no individual worker with a high-school education could claim a higher wage on this account as the effect is due largely to the mutual stimulation of a group of workers with high-school educations.

Another reason for the difference in the calculation of the worthwhileness of education for the individual and for society arises from the differences in the risks involved. This might be explained best by reference to proposals for an expanded program of loans to college students to finance their education. Such a program would go further toward providing college educations than would no loans at all, but it cannot be claimed that it is the best system of financing more higher education. As was mentioned above, there are substantial risks for any individual or family in financing education. Investment in human capital is not regarded as paying off with the certainty of investment in physical capital or in natural resources. Part of the uncertainty concerning the worthwhileness of education is the result of ignorance and can be reduced by adequate dissemination of knowledge concerning opportunities. Part of the risk expectation, however, has a firm actuarial basis. The potentialities of individuals reveal themselves only slowly and the process of education includes their maturation. The individual student at elementary and secondary-school levels, or his family, cannot be expected to be able to know about his future. Thus, they could not be expected to decide on more education just because *on the average* education pays off, though society as a whole can make this decision on the basis of averages. Even at the college level the uncertainties in the student's own mind and in his family's are still very great.

The risks of default on student loans, as they are evaluated by college lending officers or by government acting for society, can be reduced by aggregating the risks and transferring the responsibility to a central organization, just as in a regular insurance plan. But the risks in the eyes of the individual and his family cannot be transferred as long as he or his family is obligated to repay the loan.[13]

This argument also leads to the conclusion that a general loan program would have a bias against low-income families, assuming differences among different income groups in willingness to take risks. Thus, a general loan program does not achieve the objective of equalizing educational opportunities. In addition, since there are regional differences in incomes, the biases would have differential regional effects on the availability of higher education.

The difference between society's view and employers' views helps explain why relatively little formal education is financed by business and why that which is business-financed is likely to be highly specific. Though society as a whole will reap all the benefits of educating its citizens, firms that finance the education of their employees will not necessarily receive the full benefits, owing to the inalienability of human capital. There are relatively few instances in which a firm can be sure of a full payoff for educating the workers. If the education is specific enough, a firm may be sure that no other firm can use it, but it can never be sure of a full recovery itself. There are, of course, examples of educational programs sponsored by firms, and there are societies in which the firm-employee relationship is so close as to make such programs more feasible than they are in the United States. The ultimate vesting of ownership of his labor with the individual forestalls general reliance on business sponsorship, however.

One of the important products of higher education is the discovery of new knowledge. New breakthroughs in knowledge are, however, more uncertain than is the development of the customary skills. Thus, economic calculations for private, individual financing of education for research are in turn likely to be even less reliable than they are for conventional training.

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[13] See William Vickrey, ch. 16 of this publication.

These rather pessimistic views of the adequacy of private support for higher education must be checked against the calculations that have been made of the payoff on investment in higher education. Calculations such as those by Houthakker[14] and Becker[15] suggest a rate of return on investment which, on the face of it, is not higher than that which is available for many types of physical capital. However, it should be noted here, as Becker and others have done, that this rate is not an entirely accurate measure of the return on investment in education either for the individual or for society. It does not include an allowance for the costs to the individual or to society other than forgone income. Inclusion of such costs would lower the rate still further.

In part the low rate can be explained by the fact that not all the return on education is received by the educated workers. There are wide benefits to society which the rate does not take into account. In part it reflects the mixture of consumption and investment motives in individual education. Since the figure is an average, a profession-by-profession survey would show a higher rate for some, say medicine and law, than for others, say college teaching. College teaching, involving as it often does the previous earning of a Ph. D. degree, is notoriously poorly paid. That it nonetheless continues to attract personnel must in large part reflect noneconomic or "consumption" motivations as well as those of investment.

Therefore, in addition to "external" benefits of education of the labor force, which cannot be transferred to labor's price market mechanism, there are indications that the market mechanism does not accurately impute to labor all the returns it would in a perfect market. One implication of the discussion in part I of this paper is that there are inevitably serious departures from such a market in characteristics of the demand for education and its products. Economists long ago recognized the existence of such elements in the labor market when labor was divided into categories of "noncompeting" groups. The terminology is somewhat unfortunate but nonetheless suggestive. Monetary returns do not encompass and adequately measure all the rewards of education to the individual and to society.

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[14] H. S. Houthakker. Educational Income. *Review of Economics and Statistics*, 41: 24–28, February 1959.

[15] Gary S. Becker, cited in footnote 6 of this chapter.

IV. Summary

There are no easy guides or obviously good rules of thumb for determining the educational policy that is optimal for economic growth and also fulfills all the other social goals of education. The patterns that now exist represent the influence of tradition and of occasional crises more than they indicate rational planning or allocation of resources by a reasonably effective market mechanism. Some areas of higher education have nonetheless been successful in meeting the needs of society; other areas have obviously not been. Though we have muddled through in the past, the internal and external pressures on our system will not validate such behavior much longer.

It has been useful to make the analogy between human capital and physical capital because the analogy suggests the critical issues that need to be analyzed. It is a suggestive analogy because it indicates the appropriate tools of analysis that need to be applied in determining the optimal allocation of resources to education for economic growth.

However, a conclusion that emerges most clearly from the foregoing discussion is that an educated labor force, though undoubtedly a productive capital resource, is not really like most physical capital as far as its market characteristics are concerned. It is quite different in terms of the demands for its services and in the conditions of its supply. It would be misleading to think otherwise. A final example will help illustrate this point. There has been a good deal of concern in the United States in recent years over the adequacy of the quantity and quality of teaching personnel even at the elementary- and high-school levels. Yet studies of the rate of return on the investment in teachers as a form of human capital would undoubtedly show, as the previously quoted aggregative studies have shown, that this rate is low relative to other rates of return available in the economy. Taking the market mechanism at face value, it would seem to be signaling that there are too many teachers and that the resources we have would earn a higher return if shifted elsewhere. Yet we quite rightly do not believe those signals. As was pointed out above, there are many good reasons why the market mechanism by itself would not lead to optimal resource allocation in this field. Human capital is not like physical capital in a number of ways and cannot be expected to behave as if it were. Economic analysis, if it is to help form optimal social policy, must fully appreciate the uniqueness of the human resource.

CHAPTER 9

Income and Education: Does Education Pay Off?

*Herman P. Miller**

IT IS GENERALLY ACCEPTED, on more or less intuitive grounds, that income and schooling go together. Persons who have not gone beyond elementary school are seldom qualified to hold any but the most menial jobs, and persons who aspire to professional or managerial work generally need at least 4 years of college training. In a society where one-third of the salesmen and one-fourth of the office clerks have gone to college, the man who is inadequately schooled would appear to stand little chance of achieving financial success.

Statistical studies of the relationship between income and schooling tend to support our intuitive feelings on this matter. Numerous studies, conducted under varying economic conditions, have shown that persons with more schooling tend to earn more money. The studies support the thesis that investment in education provides, on the average, a favorable return when compared with other investment yields. Despite the marked increase in recent years in the number of proportion of college graduates, for example, their relatively high incomes were maintained. Labor market demands for more highly educated people appear to have kept pace with the increased supply. During the past generation professional and managerial employment—two major outlets for the college-trained—increased 50 percent, absorbing the enlarged flow of college graduates.

Education, however, is only one of many factors that determine income; both income and education may be related to more fundamental traits like ability, drive, and imagination, or to family status and prestige in the community. The relationship between schooling and earnings may be spurious, and what essentially may remain undisclosed are underlying causes both of advanced education and higher earnings, conditions such as superior intelligence, better home environment, and greater opportunities both socially and economically.

Recent analyses of returns on investment in human resources have interpreted income increments accompanying additional years of schooling as the consequence of the schooling. It is generally assumed that the attainment of more schooling, particularly at the secondary and college level, in some measure improves the productivity of the individual, and thereby his economic contribution and earnings.[1]

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*Special assistant in the Office of the Director of the Bureau of the Census, U.S. Department of Commerce.

Economists have long argued that earnings could be increased by improving human capacity and productivity. This type of formulation was made 200 years ago by Adam Smith in his famous comparison between investment in education and in a machine;[2] and it appears in similar form in current economic literature as well.[3] Very likely this same formulation underlies much of the emphasis placed on education by minority groups.

While I have on other occasions set forth findings from the Census Bureau's population surveys on income differentials and education, findings that give support to the idea that college education pays off in enhanced earnings, the present chapter is designed to illustrate by two examples that we must consider the earnings returns to the individual cautiously. Education has many values, and these values are not measured exclusively by income returns. There are barriers to job opportunities and factors of selection among individuals and groups that interfere with a direct association between education and income. The time perspective we use to assess income yield may not be adequate; schooling itself delays employment and earnings, and generation-to-generation effects of education[4] such as those reported in the Brazer-David study elsewhere in this volume, do not often appear in the statistics.

Some groups in the population, particularly nonwhites, have not realized income gains commensurate with increases in their education. During all the years for which figures on income, education, and color are available, the correlation between income and education is much higher for whites than for nonwhites. Among nonwhite men 25-44 years old—an age group that has benefited from recent advances in education and from the migration of Negroes from southern farms, and one that also encompasses the period of peak earnings—elementary school graduates had about the same average income as high school graduates despite the 4-year difference in schooling. Moreover, during the past decade nonwhites have made far greater relative gains in education than have whites, but income differentials between the two groups have remained more or less constant. Under conditions that prevailed in 1949, male college graduates could have expected to earn about $296,000 over a lifetime.[5] For whites the average was about $300,000, as compared with only $133,000 for nonwhites and the nonwhite college graduate could expect to earn no more over a lifetime than the white with only 8 years of schooling.

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[1] Theodore W. Schultz. "Education and Economic Growth," in National Society for the Study of Education Sixtieth Yearbook, Nelson B. Henry, ed., Part 2, *Social Forces Influencing American Education, 1961*, University of Chicago Press, p. 46-88.

[2] Adam Smith. *The Wealth of Nations*. Everyman's Library. New York, E. P. Dutton, 1910. Book I, p. 88-89.

[3] Theodore W. Schultz. Capital Formation by Education. *Journal of Political Economy*, 68: 571-583, December 1960.

[4] See Harvey E. Brazer and Martin David, ch. 2 of this publication.

An analysis of income changes for veterans also raises some questions about the extent to which education is primarily responsible for the income gains made by veterans of World War II. Nearly 8 million veterans of World War II accepted education and training benefits provided under the Servicemen's Readjustment Act of 1944, at a cost of about $14.5 billion to the Federal Government. Scholarship aid under the GI program raised the educational level of veterans considerably above that of nonveterans, and income differentials between the two groups increased progressively from zero in 1948 to a peak of 30 percent in 1955. Yet, and this is the important fact, veterans who did not receive scholarship aid under the GI program had only slightly lower average incomes than those who did, despite their lower average educational attainment. It is possible that 1955 was too soon to attempt to measure financial gains associated with training completed after the close of World War II. Pending additional data on the subject, however, we must conclude that there is some question as to whether education was a primary factor in the development of income differentials between veterans and nonveterans.

The meaning of the relation between education and income is not easy to assess if we insist upon scientific standards of evidence, and certainly the figures require more penetrating analysis than they have received to date. Other recent studies have observed the sluggish way in which nonwhites' incomes have responded to increases in education. With the exception of an analysis by Becker now in process, being made for the National Bureau of Economic Research, the income responsiveness of a narrowing of educational differences between white and nonwhite groups has been ignored or treated in a very cursory way.[6]

Nonwhites are virtually excluded from certain occupations, and many nonwhite men and women who have completed college are in low-paid jobs. It is entirely possible and indeed likely that productivity potentials of nonwhites have been raised, as suggested by the theory that correlates increases in years of schooling with additions to human capital, but these potentials may not have materialized, owing to discrimination. There are, however, other factors that have a bearing on the situation and these relate to the precise meaning of the unit of analysis—a year of schooling—by which education is measured.

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[5] The comparable estimate for 1958 was $435,000. See Herman P. Miller, "Annual and Lifetime Income in Relation to Education: 1939–59," *American Economic Review*, 50: 962–986, December 1960.

[6] See, for example, Gary S. Becker, "Underinvestment in College Education?" *American Economic Review*, Papers and Proceedings, American Economic Association, 50: 346–378, May 1960; and Edward F. Renshaw, "Estimating the Returns to Education," *Review of Economics and Statistics*, 42: 318–324, August 1960, part 1.

The available statistics used to measure economic returns from education are in terms of years of schooling completed. In view of obvious differences in the importance of a year of elementary school, of high school, and of college, these classifications by level of education are made in the basic data. Since they distinguish 1 year of schooling from another, they introduce a qualitative factor into the statistics. Beyond this distinction, no allowance is made for differences in the quality of education provided or received. Crude attempts that have been made, largely for the purpose of historical comparison, to modify the concept in terms of school-year equivalents based on days of schooling per year[7] must be regarded as faltering first steps. Statistics which show that the average young nonwhite male is only about 1½ years behind the average young white male in years of schooling completed must present an erroneous impression of the educational difference betwen the two groups when account is taken of possible differences in the quality of schooling. Qualitative differences have tended to be ignored in measures of physical capital[8] and, except for minor attention, they are also being ignored in recent work on human capital. For broad overall analyses, it is perhaps essential to ignore the qualitative element, especially since it eludes accurate measurement. This logic seems much less applicable when attention is focused on relatively small subgroups in the population.

Although qualitative differences in education are difficult to measure, there can be little question that on the average nonwhite children receive schooling of lesser quality. This problem has received intensive study by Dr. Eli Ginzberg, director of the Conservation of Human Resources Project at Columbia University, who concludes that—

> . . . considerable weight must be given to poor schools. . . . Often these schools in predominantly Negro neighborhoods are in serious disrepair, are staffed by inexperienced teachers, and are unable to provide instruction geared to the widely different abilities of their students.[9]

Dr. Ginzberg cites many instances that attest to the lower quality of Negro schooling. The Speaker of the House of Representatives of Georgia is quoted as stating that "What the Negro child gets in the sixth grade, the white child gets in the third grade."[10] As presumptive evidence of great differences between educational opportunities of Negroes and whites, Ginzberg quotes a 1956 report of an earlier study by the National Manpower Council showing that "the average freshman in a Negro college scored only a little higher on aptitude tests than the lowest ranking freshman in the average college."[11]

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[7] Theodore W. Schultz. Education and Economic Growth, op. cit., and ch. 7 of this publication.

[8] Mary Jean Bowman. Ch. 6 of this publication.

[9] Eli Ginzberg. *The Negro Potential*. New York, Columbia University Press, 1956. p. 58.

Another important limitation of the "years of schooling completed" concept is that no differentiation is made with respect to the learning gained through exposure to a given amount of education. "Years of schooling" has an entirely different meaning for a student who has done well in a school system with high standards and established bases for measuring achievement from the meaning it has for a poorly motivated student who has just managed to get by in a school system with low standards. Education, after all, is not synonymous with time spent in a schoolroom. If as a result of cultural, social, or economic conditions nonwhite students as a group tend to have a relatively low standing in their classes, they cannot expect to derive as much from a year of schooling as do other students. Therefore the narrowing of differentials in years of schooling that has taken place is not matched by a parallel narrowing of differences in scholastic achievement or in later earnings, since there appears to be an association between scholastic achievement and occupational success.[12] There is some empirical basis for the judgment that problems relating to behavior, discipline, and lack of motivation occur disproportionately in Negro areas and this may well be part of the explanation for the low correlation between income and education for nonwhite men.[13] The whole question of the relationship between income (or earnings) and IQ, performance on aptitude tests, standardized achievement tests, and other objective measures has been inadequately explored despite the existence of much basic data on the subject. In view of the importance of education and the increasing share of our national income that is being devoted to educational services, it is perhaps time to intensify the efforts devoted to the collation of school and Army records with socioeconomic data collected in household surveys, for the purpose of measuring more precisely the economic importance of education to the individual when other relevant factors are taken into account.

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[10] Ibid., p. 53.

[11] Ibid., p. 55.

[12] *See* Donald S. Bridgman, Problems in Estimating the Monetary Value of College Education, p. 180-184, *and* Dael Wolfle, Economics and Educational Values, p. 178-179, both in *Higher Education in the United States, the Economic Problems*, Seymour E. Harris, *ed.*, Cambridge, Mass., Harvard University Press, 1960; *and* Ernest Havemann and Patricia Salter West, *They Went to College; The College Graduate in America Today*, New York, Harcourt, Brace & Co., 1952, p. 164.

[13] For a recent study, *see* Calvin F. Schmid, *Impact of Recent Negro Migration on Seattle Schools* (paper presented at the International Population Conference, Vienna, 1959).

I. Income and Education: Differences between Whites and Nonwhites

ANNUAL INCOME AND EDUCATION

Migration and technological change during the past two decades are altering the occupational patterns of the nonwhite, from the southern farm laborer or sharecropper to the low-paid industrial worker. In 1940 about three-fourths of all nonwhites in the United States lived in the South, where they were largely engaged in agriculture. By 1950 the proportion residing in the South dropped to about two-thirds;[14] and in 1960 it was somewhat more than half (56 percent).[15] Even in the South, nonwhites are now more concentrated in urban areas than ever before. In 1960, over half (58 percent) of all southern nonwhites were urban residents.[16]

The figures on the occupational distribution of nonwhite males tell the story even more dramatically. In 1940, 4 out of 10 employed nonwhite males in the United States worked on southern farms as either laborers or sharecroppers.[17] In 1960, fewer than 2 out of 10 were employed in agriculture, and about half of them were either unskilled or semiskilled workers at nonfarm jobs.[18] The change in the occupational status of nonwhites was accompanied by a marked rise in educational attainment, proportionately far greater than the rise for whites. Among men in the 25–29-year age group—and these are the ones most likely to have benefited from recent advances in education—the median years of school completed by nonwhites increased by about two-thirds—from 6.5 years in 1940 to 10.9 years in 1959 (table 1). The increase for whites in the same age group was only about one-fifth—from 10.5 years to 12.5 years. In 1940 the average nonwhite male 25–29 years of age was about 4 years behind the average white male of the same age in his schooling. By 1959 this gap had been narrowed to only 1½ years.

The most dramatic advances in schooling among nonwhites have occurred at the lower elementary grades. In 1940 one-third of the nonwhite males 25–29 years of age in the United States had completed less than 5 years of school. By 1959 the proportion had been reduced to only 8 percent, and this decrease was largely responsible for the striking reduction in illiteracy among nonwhites during the past two decades.[19] Gains in education among nonwhites during that period were by no means restricted to the lower grades. The proportion of high school graduates among nonwhite men 25–29 years of age rose fourfold, from 10 percent to 40 percent, and the proportion of college graduates more than tripled.

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[14] U.S. Department of Commerce, Bureau of the Census. *1950 Census of Population—Preliminary Reports*. Series PC–7, No. 2, Employment and Income in the United States by Regions, 1950.

[15] U.S. Department of Commerce, Bureau of the Census. *U.S. Census of Population: 1960, General Population Characteristics, United States Summary*. Final Report PC(1)–1B, table 57.

[16] Ibid., table 52.

[17] U.S. Department of Commerce, Bureau of the Census. *1950 Census of Population—Preliminary Reports*, op. cit.

[18] U.S. Department of Labor, Bureau of Labor Statistics. *Employment and Earnings*, vol. 6, May 1960.

TABLE 1.—**Level of schooling completed by white and nonwhite males, United States, selected dates, 1940–59**

Date, age, and color	Percent by level of schooling completed			Median school years completed
	Less than 5 years of elementary school	4 years of high school or more	4 years of college or more	
WHITE				
25 years and over:				
March 1959	7.1	43.6	10.8	11.1
March 1957	7.9	41.1	10.1	10.7
April 1950	9.5	33.5	7.6	9.3
April 1940	11.8	23.8	5.8	8.7
25–29 years:				
March 1959	2.6	65.9	15.7	12.5
April 1950	3.7	52.6	10.1	12.4
April 1940	3.9	38.6	7.5	10.5
NONWHITE				
25 years and over:				
March 1959	28.1	18.8	3.6	7.6
March 1957	30.3	16.2	2.6	7.3
April 1950	35.3	12.0	2.0	6.4
April 1940	45.3	6.7	2.1	5.4
25–29 years:				
March 1959	8.2	40.0	5.6	10.9
April 1950	18.8	20.4	2.3	8.4
April 1940	32.8	10.4	1.5	6.5

SOURCE: Data on nonwhites from U.S. Department of Commerce, Bureau of the Census. *Current Population Reports*, Series P-20, No. 99, table 3. Figures for whites derived from data underlying the published table.

Despite the proportionately greater gains in education among nonwhites during the decade 1950–59, earnings differentials between the two groups did not change much (table 2). In 1950 the average wage or salary income for nonwhite workers was about three-fifths of that received by white workers ($1,800 as compared with $3,006). In 1959 this ratio was unchanged: the median for nonwhite workers was $2,800, as compared with $4,900 for white workers. Prior to 1950 there had been a substantial narrowing in earnings differentials between whites and nonwhites. This, however, was not primarily attributable to differences in education, but was rather closely related to war-induced labor market conditions, including extreme shortages of unskilled labor and Government regulations such as those of the War

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[19] U.S. Department of Commerce, Bureau of the Census. *Current Population Reports*, Series P-20, No. 99, 1960, table 3.

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Labor Board, designed to raise the incomes of lower paid workers.[20] Although the educational gains among nonwhites were concentrated in the younger age groups, income differentials between whites and nonwhites in these groups were virtually unchanged during the decade 1950–59. Table 3 shows that in 1949 and in 1956 among males 25–44 years of age, nonwhites received about one-half the income received by whites.

TABLE 2.—Median annual money wage or salary income of white and nonwhite male workers with wage or salary income, United States, 1939 and 1950–59

Year	White	Nonwhite	Ratio of nonwhite to white
1939	$1,112	$460	41
1950	2,982	1,828	61
1951	3,345	2,060	62
1952	3,507	2,038	58
1953	3,760	2,233	59
1954	3,754	2,131	57
1955	3,986	2,342	59
1956	4,260	2,396	56
1957	4,396	2,436	55
1958	4,569	2,652	58
1959	4,902	2,844	58

SOURCE: U.S. Department of Commerce, Bureau of the Census. *Historical Statistics of the United States: Colonial Times to 1957*, and various issues of *Current Population Reports*, Series P-60.

Some of the basic statistics pertaining to the relationship between annual income and educational attainment for whites and nonwhites are presented in table 3, which shows the average (mean) annual income in 1939, 1949, and 1956 of men with different amounts of schooling.[21] (Similar data for 1959, based on the 1960 census, will soon be available.) The data are presented separately for three broad age groups for all men in the United States 25 years old and over so that the figures can be examined independent of changes in the age distribution of the population. Women have been excluded from the analysis; since a large proportion of them do not enter the labor market and many of those who do are employed on a part-time basis only, the relationship between their income and education may be distorted. In contrast, practically all adult men are full-time workers and it can therefore be assumed that any advantages that may accrue from more schooling are reflected in their incomes.

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[20] For a discussion of the narrowing of earnings differentials during World War II, see Herman P. Miller, "Changes in the Industrial Distribution of Wages in the United States, 1939–1949," in *Studies in Income and Wealth*, vol. 23. Princeton, N.J., Princeton University Press, 1958.

[21] For each year the mean income was obtained as a summation of the product of the average income and the proportion of persons for each income level. Persons with no income were excluded. For income levels below $5,000 in 1939, below $10,000 in 1949, and below $6,000 in 1956, the midpoint of each class interval was assumed to be the average. For 1939, $9,000 was used for the "$5,000 and over" interval; for 1949, $20,000 was used for the "$10,000 and over" interval; and for 1956, the averages for the "$6,000 to $10,000" and "$10,000 and over" intervals were fitted by the use of Pareto curves. See the note to table 3 on comparability, for more details regarding the limitations of the data.

TABLE 3.—Mean income for males 25 years of age and over by educational attainment, color, and age, United States, 1939, 1949, and 1956

Educational attainment and age	White			Nonwhite		
	1939 [1]	1949 [2]	1956 [2]	1939 [1]	1949 [2]	1956 [2]
25 YEARS AND OVER						
All	$1,419	$3,376	$4,827	$[illegible]	$1,664	$2,471
ELEMENTARY SCHOOL:						
All	1,125	2,540	3,278	560	1,466	2,0[illegible]
Less than 8 years	(3)	2,234	2,801	(3)	1,356	1,921
8 years	(3)	2,875	3,777	(3)	1,909	2,892
HIGH SCHOOL:						
All	1,538	3,566	5,129	772	2,133	3,141
1 to 3 years	1,413	3,305	4,[illegible]	728	2,030	3,087
4 years	1,685	3,840	5,347	879	2,278	3,215
COLLEGE:						
All	2,297	5,799	7,604	1,064	2,739	3,831
1 to 3 years	1,904	4,501	6,477	948	2,414	(4)
4 years or more	2,646	6,260	[illegible]	1,258	3,177	(4)
25 TO 44 YEARS						
Total	1,360	3,431	5,260	680	1,781	2,826
ELEMENTARY SCHOOL:						
All	1,028	2,618	3,699	555	1,569	2,441
Less than 8 years	(3)	2,316	3,222	(3)	1,422	2,292
8 years	(3)	2,850	4,105	(3)	1,915	3,062
HIGH SCHOOL:						
All	1,436	3,425	5,192	745	2,145	3,119
1 to 3 years	1,356	3,293	4,[illegible]	711	2,007	3,172
4 years	1,5[illegible]2	3,667	5,494	816	2,317	3,050
COLLEGE:						
All	2,127	4,836	7,216	1,016	2,692	(4)
1 to 3 years	1,8[illegible]	4,128	6,725	900	2,413	(4)
4 years or more	2,411	5,512	7,[illegible]	1,1[illegible]	3,032	(4)
45 TO 64 YEARS						
Total	1,562	3,715	5,149	630	1,680	2,427
ELEMENTARY SCHOOL:						
All	1,235	2,843	3,740	590	1,535	2,151
Less than 8 years	(3)	2,537	3,267	(3)	1,428	2,027
8 years	(3)	3,185	4,184	(3)	2,027	(4)
HIGH SCHOOL:						
All	1,955	4,176	5,473	806	2,222	3,368
1 to 3 years	1,718	3,712	4,833	814	2,137	(4)
4 years	2,245	4,709	6,101	1,009	2,365	(4)
COLLEGE:						
All	2,[illegible]21	6,871	9,361	1,212	3,094	(4)
1 to 3 years	2,361	5,555	7,259	1,0[illegible]	2,322	(4)
4 years or more	3,[illegible]	8,054	11,185	1,3[illegible]	3,688	(4)
65 YEARS AND OVER						
All	(3)	2,1[illegible]	2,452	(3)	877	939
ELEMENTARY SCHOOL:						
All	(3)	1,636	1,972	(3)	805	911
Less than 8 years	(3)	1,457	1,800	(3)	765	862
8 years	(3)	1,911	2,257	(3)	1,248	(4)
HIGH SCHOOL:						
All	(3)	2,776	2,934	(3)	1,346	(4)
1 to 3 years	(3)	2,421	2,590	(3)	1,206	(4)
4 years	(3)	3,157	3,385	(3)	1,549	(4)
COLLEGE:						
All	(3)	4,568	5,313	(3)	2,035	(4)
1 to 3 years	(3)	3,485	4,220	(3)	1,559	(4)
4 years or more	(3)	5,490	6,010	(3)	2,451	(4)

[1] Restricted to persons reporting $1 or more of wage or salary income and less than $50 of other income for native white and Negro males 25-64 years old only.

[2] Total money income.

[3] Not available.

[4] Base is less than 100 sample cases.

SOURCE: Data for 1939 derived from U.S. Department of Commerce, Bureau of the Census, 1940 Census of Population, *Education: Educational Attainment by Economic Characteristics and Marital Status*, tables 29 and 31. Data for 1949 derived from *1950 Census of Population*, Series P-E, No. 5-B, *Education*, tables 12 and 13. Data for 1956 derived from the consumer income supplement to the March 1957 *Current Population Survey*.

Note regarding comparability of the figures: Neither the income concept nor the statistical universe covered is directly comparable for all the years shown. The figures for 1956 are based on the *Current Population Survey* and represent the total money income of the civilian noninstitutional male population 25 years old and over. The 1949 figures are based on the 1950 census and also represent the total money income of all males 25 years old and over, including a relatively small number of institutional inmates. The figures for 1939 are based on the 1940 census and are restricted to males 25-64 years of age with $1 or more of wage or salary income and less than $50 of nonwage, nonsalary income. For this group, of course, the averages represent total money income; however, because of the way in which the data were collected, the universe has been restricted to persons who received only wage or salary income. Only about three-fifths of all the men 25-64 years old in 1940 were in this category. The effects of this restriction cannot be measured, but it is undoubtedly more important than the restrictions cited above for 1949 and 1956. It is also possible that this restriction affects college graduates more than it affects persons with less schooling, and for them it tends to create an adverse selection since college graduates are more likely to have income other than earnings.

In the 3 years for which data are presented in table 3, there is a progressive increase for both whites and nonwhites in the average amount of annual income associated with each level of schooling. This increase, however, is typically greater for whites in both absolute and relative terms. Thus, for example, in 1949 the income differential between elementary-school and high-school graduates 25–44 years old was about $700 for whites and $400 for nonwhites. When the averages for the two groups were compared for that year, the differential amounted to 25 percent for the whites and 21 percent for the nonwhites. A similar comparison for 1956 shows little difference between the average incomes of nonwhite elementary-school and high-school graduates, but among the white, a 34-percent difference.

Because of the relatively small number of nonwhite college graduates, income data for this group are not available from the 1956 sample survey. The 1950 census, however, shows for whites an income difference of 53 percent between high-school and college graduates 25–44 years old, as compared with a 31-percent difference for nonwhites. In 1956 white males in all age groups who had attended college but did not graduate had an average income $950 higher than did high-school graduates who had never attended college; those who had completed college had an average income $3,075 higher.

The figures in table 3 point to the general conclusion that the association between income and education is closer for whites than for nonwhites, and that the association for nonwhites may have diminished somewhat in recent years. The data from the 1960 census should shed considerable light on this association.

LIFETIME INCOME AND EDUCATION

Estimates of lifetime income provide summary measures of the financial returns associated with education that cannot be readily obtained from the annual data presented above.[22] The estimates of lifetime income presented here are derived figures—one might say synthetic figures—based on variations in the payments to individuals in different age and education groups in 1939 and 1949, the only years for which the base data are available in sufficient detail to permit preparation of estimates by color. The figures are therefore based on a cross section of the population in 1939 and 1949 and not on life-cycle data which would trace a man's income from the time he starts to work until he retires. Although life-cycle data on the variations of income by age are not available, there is some reason to believe that they would differ considerably from the cross-sectional data. Of course, life-cycle data would involve problems of their own, since they would contain variations resulting from periods of prosperity or depression, with resulting changes in opportunities for employment, in wage rates, and in the cost of living.[23]

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[22] For additional information on estimation of lifetime income, *see* Herman P. Miller, Annual and Lifetime Income in Relation to Education: 1939–1959. *American Economic Review*, 50: 962–986, December 1960.

Illustrative of the kinds of differences presented by cross-sectional and life-cycle data on income and age are the variations in the treatment of annual income gains due to productivity in the two procedures. At any given time, wage differentials by age groups within a specific occupation tend to be a function of skill, experience, and various random factors that are always present, like illness and accidents. The annual gains in income due to increased productivity, therefore, are not of major significance in cross-sectional surveys because such gains do not affect the distribution of income among age groups. In contrast, the secular growth in real income per capita, which has averaged 1.6 percent per year since the turn of the century, has a marked impact on the pattern of earnings over a lifetime by exerting a continuous upward force on the earnings of the individuals in the study.

Consider, for example, a group of 100 men of the same age, education, skill, and experience who started to work in a particular occupation in 1925 at age 25. If the average income for the group is expressed as 100 in the first year of work, 10 years later (at age 35) the average would be 117 if we assume an annual growth rate of 1.6 percent and no other changes. By age 45 the average would be 137, and in 1955 (at age 55) it would be 161. If, on the other hand, we consider a cross section of men in the same occupation in 1955, the differentials by age would not be at all related to the assumed growth during the preceding 30 years, but would reflect only differences associated with skill, experience, and random factors existent at that time.

Standard life-table techniques were used in computing the figures shown in table 4. First, an estimate was made of the survival rate per 100,000 white and nonwhite children born in 1939 and in 1949; that is, the number born who would be alive at specific ages. These estimates were made from appropriate life tables.[24] By way of illustration—it was estimated that out of 100,000 white infants born alive in 1949, about 96,000 would survive to age 18, at which time they would enter the labor market. The basic problem consisted of estimating the lifespan of these 96,000 survivors and the amount of income they would receive during their lifetime. For this purpose it was assumed that survival rates for men in each educational group would be the same as for all white males in 1949. On this basis it was estimated that these 96,000 men would live a total of nearly 5 million man-years between age 18 and the time the last one died. It was further assumed that during each year of life these men would receive an average income corresponding to that received by men in the same age group with the same amount of education. The averages used for this purpose were arithmetic means computed for detailed age groups by means of procedures described above.[25]

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[23] For a discussion of such data, see W. S. Woytinsky. Income Cycle in the Life of Families and Individuals. *Social Security Bulletin*, 6 : 8–17, June 1943.

[24] U.S. Department of Commerce, Bureau of the Census. *U.S. Life Tables and Actuarial Tables*, 1939–41, and U.S. Department of Health, Education, and Welfare, Public Health Service, National Office of Vital Statistics, *Vital Statistics—Special Reports*, United States Life Tables, 1949–51, vol. 41, No. 1.

There are several cautions that should be considered before discussing the figures in table 4. First, the figures should not be interpreted as returns from education, because they reflect the impact of many of the factors that influence the relationship between income and education. In addition, the figures are not exactly comparable from year to year owing to changes in the income concept. The data for 1939 are for wages and salaries, whereas those for 1949 are for total income. Finally, the estimates for each year reflect the economic conditions and other circumstances which existed in that year. The

TABLE 4.—Lifetime income based on arithmetic means for males in selected age groups, by color and by years of schooling completed, United States, 1939 and 1949

[In thousands]

Years of schooling completed	White		Nonwhite	
	1939[1]	1949[2]	1939[1]	1949[2]
AGES 18 TO DEATH				
All years of school	(3)	$157	(3)	$69
ELEMENTARY SCHOOL:				
All	(3)	121	(3)	62
Less than 8 years[4]	(3)	107	(3)	59
8 years	(3)	135	(3)	79
HIGH SCHOOL:				
All	(3)	171	(3)	88
1 to 3 years	(3)	160	(3)	84
4 years	(3)	188	(3)	95
COLLEGE:				
All	(3)	258	(3)	113
1 to 3 years	(3)	213	(3)	98
4 years or more	(3)	301	(3)	133
AGES 18 TO 64				
All years of schooling	$56	139	$21	64
ELEMENTARY SCHOOL:				
All	43	107	19	57
Less than 8 years[4]	(3)	95	(3)	54
8 years	(3)	119	(3)	71
HIGH SCHOOL:				
All	65	148	27	79
1 to 3 years	58	140	25	76
4 years	73	162	31	85
COLLEGE:				
All	95	229	37	101
1 to 3 years	79	184	33	88
4 years or more	112	253	41	117

[1] Restricted to persons reporting $1 or more of wage or salary income and less than $50 of other income for native whites and Negroes.
[2] Total money income.
[3] Not available.
[4] Includes persons reporting "No years of schooling completed" (not shown separately).

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[25] See footnote 21; for age detail, see sources referred to in table 3.

increase, for example, in the value of a college education for white males by about $140,000 between 1939 and 1949 reflects the increase in prices as well as changes in the underlying relationships.

In 1949 white males had an expected lifetime income of about $157,000, as compared with $69,000 for nonwhites. For both groups additional schooling was associated with increases in lifetime income; but the gains were much more striking for whites than for nonwhites. The difference between the lifetime income of elementary-school and of high-school graduates was $53,000, or 39 percent, for whites as compared with only $13,000, or 16 percent, for nonwhites. Similarly, the income difference between white high-school and college graduates was $111,000, or 61 percent, as compared with a difference of $38,000, or 31 percent, for nonwhites. Viewed alternatively, the average nonwhite elementary-school graduate in 1949 had an expected lifetime income that was about 61 percent of that expected by the average white with the same amount of schooling. At the high-school level this ratio dropped to 51 percent, and among college graduates it was only 44 percent. These figures lend further support to the conclusion cited earlier that the association between income and education is closer for whites than for nonwhites.

II. Income and Education: Veteran, Nonveteran Differences, 1917–59

While World War II was still in progress, the Congress enacted the "GI bill of rights," designed to assist veterans in reestablishing themselves in civilian life. A most important part of this program was the provision of Government-financed education intended to improve permanently the economic status of veterans. Nearly 8 million veterans of World War II accepted the education and training benefits provided under the act. Over 2 million received college or university training at Government expense, and an additional 3.5 million received free education below the college level at elementary and secondary schools, vocational and trade schools, technical institutions, and business schools—the largest program ever undertaken by the Federal Government to provide financial aid to individuals for their education and training.[20]

The impact of the GI bill on the educational attainment of veterans is shown in table 5. In 1947, when most of the former servicemen were in the initial phase of their training under the GI bill, veterans were already a more highly educated group than nonveterans. This was, of course, to be expected since many men were rejected for military service because they were of low intelligence. There was no difference in the proportions of younger veterans and nonveterans (25–34 years of age) who had completed college; but a larger proportion of the veterans had been exposed to some college training, even if they did not graduate. By 1952 this picture had changed markedly. The proportion of college graduates among younger veterans increased from 7 percent to 12 percent, as compared with an increase from 6 percent to 9 percent for younger nonveterans. At the lower educational levels, the gains for veterans were equally striking.

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[20] U.S., The President's Commission on Veterans' Pensions, *Readjustment Benefits: General Survey and Appraisal*, Staff Report No. IX, Part A, 84th Cong., 2d sess., House of Representatives Committee on Veterans' Affairs, House Committee Print No. 291, 1956.

Since older veterans (35–44 years of age) did not make as much use of the education and training provisions of the GI bill as did the younger ones, the older group's educational attainment did not change as much. The most significant change for the older veterans was a sharp drop in the proportion who quit school upon completion of the eighth grade and a rise in the proportion of high-school graduates. Between 1947 and 1952 there was no change in the proportion of college graduates among older veterans.

TABLE 5.—Percent distribution of male veterans of World War II and of nonveterans, by years of schooling completed, by age, United States, 1947 and 1952

Years of schooling completed	Veterans of World War II				Nonveterans			
	25–34 years		35–44 years		25–34 years		35–44 years	
	1947	1952	1947	1952	1947	1952	1947	1952
Number of veterans (thousands)	6,851	8,428	2,036	4,130	4,043	2,472	7,791	6,070
	PERCENT							
Total	100	100	100	100	100	100	100	100
ELEMENTARY SCHOOL: Total	24	20	37	27	40	43	48	41
Less than 5 years [1]	3	2	4	2	9	14	8	8
5 to 8 years	21	18	33	25	31	29	40	33
HIGH SCHOOL: Total	58	56	40	49	45	39	37	44
1 to 3 years	24	22	18	20	21	17	19	20
4 years	34	34	22	29	24	22	18	24
COLLEGE: Total	17	23	20	23	13	16	14	15
1 to 3 years	10	11	8	11	7	7	7	8
4 years or more	7	12	12	12	6	9	7	7
NOT REPORTED	1	1	2	1	1	2	1	1

[1] Includes persons reporting "no years of schooling completed," not shown separately.

SOURCE: U. S. Department of Commerce, Bureau of the Census. *Current Population Reports*, Series P-20, No. 15, Educational Attainment of the Civilian Population. April 1947, table 3; and Series P-20, No. 45, School Enrollment, Educational Attainment and Illiteracy, October 1952, table 15.

Although the GI bill was instrumental in raising the educational level of millions of younger veterans, table 5 suggests that some of them would have completed additional schooling even in the absence of the Government program. Note that in 1952 the proportion of college men was the same (23 percent) for the two age groups shown. Since relatively few of the veterans in the older age group made use of the education and training provisions of the GI bill, it can be assumed that the younger veterans used the benefits to attain a level of education that was customary at the time and that they would have attained this level had military service not interrupted their normal education. This conclusion is, of course, conjectural, but it has been suggested also by others who have examined this question in greater detail.[27]

Although millions of veterans extended their education under the GI bill, an equally large number did not take advantage of this opportunity. A comparison of the educational attainment of veterans who did and who did not accept these benefits is shown in table 6. It is

TABLE 6.—Preservice and postservice educational attainment of veterans of World War II and of the Korean conflict by use of GI training benefits

[Excludes veterans with service-connected disabilities for which they accepted Veterans' Administration compensation]

Years of schooling completed	Veterans who accepted GI training		Veterans who did not accept GI training [1]
	Preservice educational attainment	Postservice educational attainment [1]	
Number (thousands)	7,260	7,260	8,788
	PERCENT		
Total	100	100	100
ELEMENTARY SCHOOL	16	16	25
HIGH SCHOOL:			
Total	63	48	61
1 to 3 years	23	19	29
4 years	40	29	32
COLLEGE:			
Total	21	37	13
1 to 3 years		16	6
4 years or more		21	7

[1] As of September 1955.

Source: U.S., The President's Commission on Veterans' Pensions, *Readjustment Benefits: General Survey and Appraisal*, Staff Report IX, Part A, 84th Cong., 2d sess., House Committee on Veterans' Affairs, September 1956, app. B, tables 5 and 8.

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[27] In a paper read before the annual meeting of the Southern Sociological Society on Apr. 6, 1961, Dr. Charles B. Nam, education analyst, Bureau of the Census, stated: "One general conclusion which can be reached from this analysis is that the number of college-trained men in the population was increased substantially because of the postwar education of veterans, but that, even if the benefits of the GI education and training programs had not been available, the rising secular trend in the formal educational composition of the male population would have continued unabated and at the same general level."

quite clear that veterans who took postservice training were on the average much better educated initially than those who did not. Only 13 percent of the veterans who did not use the GI bill for additional education or training were college men, and only one-third had completed high school. In contrast, 21 percent of the veterans who did take additional training had completed one or more years of college before they entered the service, and 40 percent were high-school graduates. By September 1955 over one-third of the veterans who accepted GI training were college men.

The shifting patterns of educational attainment for veterans and nonveterans were accompanied by changes in income differentials (table 7). As we shall see later, however, the income differences do not appear to be attributable entirely to education.

In 1947, younger veterans had somewhat lower incomes than nonveterans despite their greater educational attainment. Thus, any selective factors which may have produced higher incomes for veterans were not operative immediately after the war. The lower incomes of veterans at this time may have been due to several factors, including the greater work experience of the nonveterans as a result of their civilian employment during the war and also to the loss of civilian employment during 1947 by many veterans who went to school part time or who served in the Armed Forces during part of the year. By 1948 veterans and nonveterans had the same average incomes, and in every year thereafter veterans experienced relatively greater income gains, reaching a maximum differential of 30 percent in 1955. Because of the changing age composition of veterans within the age group 25–34 during recent years, it is difficult to make meaningful comparisons between veterans and nonveterans in this age group since 1955.

The veterans who were 25–34 years old in 1947 had by 1959 moved into or through the 35–44-year age group. As a result, the income differential between veterans and nonveterans within this age group was beginning to increase markedly. Until 1954, veterans who were 35–44 years old had only slightly higher incomes than did nonveterans. In 1956, the differential increased to 15 percent, and in 1959 it rose still further, to 25 percent.

Nonveterans have a greater tendency to lose time from work than do veterans, presumably because of ill health or because they work at less skilled jobs and are more subject to layoff. Table 7 shows that the average income of veterans is about 20 percent higher than that of nonveterans even when account is taken of the differential effects of part-time employment.

TABLE 7.—**Median incomes of male veterans and nonveterans of World War II, by age and extent of employment, United States, 1947–59**

Year	Median total money income				Ratio of veterans' income to nonveterans	
	25–34 years of age		35–44 years of age			
	Veterans	Nonveterans	Veterans	Nonveterans	25–34 years of age	35–44 years of age
ALL WORKERS						
1947	$2,401	$2,585	$2,680	$2,900	93	93
1948	2,734	2,692	3,045	3,046	102	100
1949	2,828	2,562	2,984	2,935	110	102
1950	3,056	2,626	3,294	3,234	116	102
1951	3,359	2,875	3,647	3,595	117	101
1952	3,641	3,065	3,834	3,602	118	106
1953	3,948	3,183	4,118	3,867	124	106
1954	3,978	3,073	4,227	3,818	129	111
1955	4,330	3,294	4,483	3,946	131	114
1956	4,675	3,712	4,854	4,230	126	115
1957	4,984	4,041	4,985	4,279	123	117
1958	5,010	4,171	5,225	4,306	120	121
1959	5,423	4,481	5,629	4,513	121	125
YEAR ROUND FULL-TIME WORKERS						
1955						
Percent	81	72	81	78		
Median income	$4,640	$3,854	$4,679	$4,319	120	108
1956						
Percent	83	72	80	78		
Median income	$4,944	$4,150	$5,122	$4,554	119	112
1957						
Percent	82	70	80	74		
Median income	$5,321	$4,465	$5,321	$4,792	119	111
1958						
Percent	76	66	77	70		
Median income	$5,453	$4,804	$5,609	$4,844	114	116
1959						
Percent	77	70	79	73		
Median income	$5,798	$5,122	$6,000	$5,023	113	119

SOURCE: U.S. Department of Commerce, Bureau of the Census. *Current Population Reports*, Series P-60, annual issues.

The close association between education and income shown in the preceding tables suggests a possible causal relation between these variables. This view, however, is not supported by the facts available from a study made in 1955 by the Bureau of the Census for the President's Commission on Veterans' Pensions.[28] In this study it was found that in 1955, at a time when the income differential between young veterans and nonveterans was at a peak of 31 percent (see table 7), there was only a 4-percent differential between the average income of veterans who participated in the educational program under the GI bill and those who did not. Specifically, the figures show that nondisabled veterans of World War II in the 25–34-year age group who received educational benefits under the GI bill had median earnings of $4,100 in 1955, as compared with a median of $4,200 for those who did not received such benefits[29] and $3,300 for nonveterans. Thus it appears that although veterans who did not receive GI training benefits

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[28] President's Commission on Veterans' Pensions, Staff Report IX, pt. A, op. cit.

[29] Ibid., p. 126.

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had much less formal education than those who did receive these benefits (table 6), the average income difference between the two groups was not very great. On the other hand, both groups of veterans had considerably higher average incomes than nonveterans had. Conceivably the full impact of the additional training was not yet reflected in 1955, and if the same study were repeated today we might find that veterans who took additional training have far higher incomes than those who did not take such training. Evidence on this point, however, is lacking at present.

CHAPTER 10

The Nation's Educational Outlay

Rudolph C. Blitz*

Most of this paper was written at Johns Hopkins University during the spring semester of 1960 while the author was on leave from Vanderbilt University. The leave was financed by a grant from the Ford Foundation. The author expresses indebtedness to Simon Kuznets, who was most generous with both his ideas and his time. He also expresses appreciation to Mrs. Constance Nathanson, who, as a research assistant, was a great help; her initiative and intuition, unencumbered by formal training in economics, uncovered many leads and new vistas.

AN INVESTIGATION of educational expenditures as a proportion of gross national product necessarily starts with a definition of the scope of education.[1] Narrowly considered, education is training in specific skills for sale in the marketplace; more broadly, it is training in skills and training for integration and participation in the life of the community as long as this training is done in some formal manner. An even broader concept of education would cover all aspects of social life. Clearly some limit is needed.

In part I the basic conceptual problems are explored; in part II the scope of the calculations is presented; and in part III the findings are discussed briefly.

I. Some Conceptual Issues

Educational expenditures[2] as one type of investment in human capital are primarily of interest here. However, for practical reasons the statistical categories of educational outlay will have to be both broader and narrower in some respects than can be justified under a rigorous definition of educational investment in human capital and will certainly not satisfy a purist.

FORMAL VERSUS INFORMAL EDUCATION

This chapter, for example, will treat all expenditures on public and private elementary and secondary education, including such programs as athletics and music as expenditures on formal education. The expenditures will not, however, include the costs of athletic coaching outside the regular school curriculum, of operating athletic clubs, or of music instruction in private homes.[2]

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*Associate professor, Department of Economics and Business Administration, Vanderbilt University.

[1] The reason for using gross national product rather than national income and the way in which my concept of gross national product differs from the conventional one will be discussed later in this chapter.

The costs of the school curriculum, which may also cover such items as driver education, athletic instruction, civics teaching, or religious instruction, should be accepted as stated, in view of the fact that the community has decided by a sociopolitical mechanism that this training is necessary for the social and occupational development of its citizens. Thus the statistical categories of educational outlay used here will represent a measure of what may be called "formal education." This is both a broader and a narrower concept than the usual concept of educational investment outlay in human beings—broader because of the considerations just discussed, and narrower because the cost of internal training programs and on-the-job training programs offered by firms are not included. The calculations are limited to the base years 1955–56 and 1957–58, the most recent academic years for which information from the Office of Education's Biennial Survey of Education is available.

GROSS VERSUS NET INVESTMENT IN EDUCATION

The educational outlays discussed in this chapter should be viewed as gross investment in human beings, since no attempt will be made to allow for the formal or informal education of persons who die or retire from the labor force. A net measure would have to make allowance for this depreciation of the stock of human capital. A few comments are in order here about the concepts of gross and net investment in education. The concept of net investment in the education of human beings is grasped most clearly if we temporarily discard the idea of informal acquisition of knowledge and consider a world where education is acquired by formal training only, where workers do not "appreciate" or "depreciate" before the final day of retirement from the labor force. However, even then both the *content* of specific formal education and the educational composition of the labor force will change over time. The problem of changes in content of formal education is similar to that of replacing an old piece of capital equipment with an improved model. Moreover, the content of formal higher education changes more rapidly than that of the elementary grades, reflecting the advances in science and technology that create obsolescence and depreciation in education, as in capital equipment. To the extent that the proportion of the people in the total labor force with more advanced formal education increases, to that extent the problem of the calculation of plus or minus "net investment" in *formal* education will become more complicated. Moreover, with an increase in the working lifespan of the population, the differences are widened between the quality of the education of retiring workers and that of their replacements and of net additions to the labor force.

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[2] The issue of school feeding programs, health programs, etc., will be discussed separately.

Formidable as these difficulties are, it is really the informal acquisition of further skills and knowledge after formal education is completed that constitutes the greatest obstacle to any meaningful calculation of net investment in education. Much informal acquisition of knowledge is deliberate—through reading, observation, conversation, conferences, and travel—and may involve outlays of time and money. Other knowledge, however, is acquired pari passu with the performance of the job or in a completely unplanned manner.

The relationships between formal and informal education are highly complex, but two important trends, moving in opposite directions, can perhaps be discerned. In Western countries, with the spread of formal education, the weakening of family ties and of the apprenticeship system and the disappearance of rural isolation, a substitution of some formal for informal education has taken place. But these different methods of absorbing knowledge are also complementary to the extent that the spread of literacy has immensely facilitated acquisition of informal education. The greater the class and job mobility, the greater will be the opportunities for and significance of informal education, which can be transmitted from the "formally more educated members" of the community to "the formally uneducated" members through social and vocational association.

The value (productivity) of informal education is reflected in promotions and rising income of members of the labor force as they gain more experience. It has to be realized, however, that the time path of a person's income reflects many factors besides increase in experience and productivity, and perhaps eventual decline in productivity and efficiency. Social mores, increases in personal good will, pensions, and tax considerations will all influence personal income.

Because of the difficulties of determining an appropriate allowance for education depreciation, no attempt will be made to calculate a measure of net investment in education. My calculations will be limited to gross concepts, which are subdivided as follows:

> *Gross educational investment in human beings*, defined as current direct and also indirect costs (to be discussed later) but excluding investment in new schools and educational equipment. Depreciation of buildings is counted as part of direct costs.
>
> *Gross total educational investment in both human beings and educational plant*, defined to include, in addition to above costs, the investment in educational plant.

The notion of gross investment implies the possibility of educational disinvestment by a process of nonreplacement. An exploration of the choices open to society, if it were to decide on educational disinvestment, will reveal a few peculiarities of educational investment in contrast to inanimate investment. The educational investment of the past is a partial explanation of the technology and the standard of living of today, including the present level of income that students forgo. Possibly substantial intellectual disinvestment could occur without resulting in an *eventual* decline in gross national product if it were gradual enough to allow for certain factor adjustment and technological modification, but it would have severe retarding effects on the rate of economic *growth* and on technological progress.

It is customary to think of a stationary economy as one with zero net investment in physical capital. What about human capital? Since a given stock of educational capital would not be completely absorbed by merely operating the productive plant in existence but would continue to produce some new ideas, we would still have advances in technology, although *net investment* both in physical capital and in education would be zero. As long as we had some technological progress through replacement we would not live in a truly stationary state. Therefore, the truly stationary state requires either zero net investment in physical capital and disinvestment in human capital at a rate sufficient to neutralize technological progress or, alternatively, disinvestment in physical capital at a rate sufficient to counteract the technological progress and the potential increase in aggregate output generated by the fixed stock of human capital.[3]

TWO TYPES OF EDUCATIONAL OUTLAYS

Gross educational investment may be discussed in two broad categories; namely, *direct costs*, which cover outlays for operation and maintenance of educational facilities, and *indirect costs*, which cover earnings forgone during the period of training.

Direct costs.—Direct costs comprise a number of different categories of outlays that involve the use of resources for the education of students and include both current costs and capital outlays (the earlier distinction between the two types of gross investment is relevant here).

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[3] The rate of production of new ideas would, of course, be to a large extent a function of the amount of educational capital already in existence at the time educational net investment would be reduced to zero. If the cutoff were to take place in the United States today, the existing research facilities would continue operation at the present level of capacity and the output of new ideas would be large. If the cutoff had taken place at the time of the English economist David Ricardo, when the educational capital was very small, the subsequent output of new ideas would have been meager. His model, which defines a stationary state merely in terms of zero net investment in inanimate capital, corresponded closely to the realities of the early nineteenth century; but today zero net investment in inanimate capital would no longer be a sufficient condition for a stationary state.

Excluded, however, should be the cost of research separately budgeted, as well as the costs of auxiliary activities, such as school feeding and school housing programs.

Conceived broadly, the purpose of institutions of higher learning is the advancement of scientific truth and human knowledge. These functions embrace both research and teaching. We are interested here primarily in the economic costs of efforts to disseminate the stock of knowledge in existence at any one time—the function of teaching. We are not interested here in the costs of society's efforts to increase over time the stock of knowledge, which is the function of research. "Organized research" looms large in the budget of institutions of higher learning, and the amounts so budgeted are growing rapidly. Only a token amount of research can be justified as a necessary concomitant of teaching proper. Graduate students have to get some research experience as part of their training, but this accounts for only a small fraction of the total research undertaken by institutions of higher learning, and in the statistics of the U.S. Office of Education this portion of the research cost is conventionally carried under the heading, "Instruction and Departmental Research." Costs of "Organized Research"—of research separately budgeted—should be excluded, as well as costs of auxiliary activities of schools and colleges. (A functional analysis of the costs of student higher education is presented in Chapter 11.)

Direct current costs of student education are represented by outlays for teachers' salaries, maintenance, and supplies. Data on these costs are collected and published by the Office of Education biennially both for elementary and secondary schools and for colleges and universities.

In addition to these direct outlays for which statistics are readily available, depreciation, interest, and the benefit of certain tax exemptions will have to be imputed to educational institutions as a cost. These imputations are called for in order to account more fully for resources used directly by educational institutions.

1. *Depreciation.*—It is the established accounting practice for nonprofit educational institutions, which is followed by all public and private schools, with the exception of commercial vocational schools, not to allow for depreciation as a part of *current cost*. This item will therefore have to be imputed as a cost, and the conventional gross national product increased by the same amount.

2. *Interest on capital outlay.*—Only to the extent that the educational plant has actually been financed by bonds is interest charged as an expense. Interest has to be imputed for the balance of the capital outlay and correspondingly added to gross national output. Interest is the cost of every capital outlay. It measures the return this capital outlay could have obtained in an alternative use. Econo-

mists sometimes impute interest on capital of business enterprises and deduct this amount from accounting net profits for the purpose of obtaining a measure of true profits. Nonprofit educational institutions by definition do not show any net profit on their books.

3. *Exemptions from property taxes and sales taxes treated as subsidies to educational institutions.*—Tax exemptions granted to educational institutions should be viewed as a subsidy from the Government to the educational sector. For example, if a tax exemption should amount to 3 percent of the educational outlay, $100 million spent on education would allow the educational sector of the economy to engage a volume of factors of production for which other sectors of the economy would have to pay actually $103 million. If the educational sector were required to pay these taxes and received from the Government a subsidy exactly equal to the amount of these taxes, then the total outlay of the educational sector would reach $103 million. An alternative way of visualizing the problem is to assume at first that schools and colleges are paying taxes like all other enterprises. A subsequent tax exemption would release funds to schools and colleges for use in attracting additional factors of production in an amount equal to the taxes saved.

Before discussing the appropriate national income accounting of tax exemptions, we shall consider the simple case of an outright cash subsidy. In conventional national income accounting, outright cash subsidies from the Government to the private sector of the economy are not treated as payments corresponding to purchases of current output.[4] In order to obtain the market value of the output of the subsidized sector, the subsidy must be deducted from the total payments which the factors of production received for producing this output in the subsidized sector. The factor cost of this sector will exceed the value of the output by the amount of the subsidy.[5]

Unfortunately, what has just been said about the conventional handling of subsidies in national income accounting has only limited applicability to subsidies to educational institutions whether given in cash or as tax exemptions. Most educational services are not priced in the market, nor do educational institutions show any profits (positive or negative) on their income statements. Therefore the assumed value of the output is by convention taken as identical with the actual costs of the factors employed by educational institutions.[6] In the case of a cash subsidy to the educational sector, no deduction is made from the gross factor income.

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[4] Subsidies are not included in the net purchases made by the Government. They will affect, however, as is their explicit intent, the allocation of resources. The total allocation of resources to any subsidized sector of the economy will be equal to the value the market puts on the output of the subsidized sector plus the subsidy received by this sector from the Government.

[5] The concept of gross national product is basically one of the value of the output at market prices. If the gross national product is calculated from the output (market value) side, the subsidy may not be included in the net purchases of the Government. If the gross national product is calculated from the income (factor cost) side, the subsidy will have to be deducted from the gross factor income in order to obtain the market value of the output . . . . Net national product should also contain this adjustment, since it also is a valuation in terms of market value. National income, however, should not exclude subsidies, since it is designed to measure payments to the factors of production for their contribution; and these do include the subsidies that the producer passes on to the factors of production." (Richard Ruggles, *An Introduction to National Income and Income Analysis*. New York: McGraw-Hill Book Co., 1949. p. 118.)

Next to be considered is the point that the subsidy in question here actually is not a cash subsidy but rather an indirect subsidy—a tax exemption—and its effect therefore has to be imputed.[7] The imputation of a value to the tax exemption attempts to measure the relative advantage which the educational sector has vis-a-vis other sectors in the economy in the purchase of services and materials as a result of the tax exemption. For a certain outlay the educational sector can buy more services and materials than other sectors as it is not required to pay taxes.

To the extent that schools are freed from paying certain taxes on their cost of operation, their costs are transferred from the nontaxpaying to the taxpaying sectors of the economy. Consider the case of two firms, A and B, each having a payroll of $1,000 per month, which constitutes their only cost of operation. Now let us assume that subsequently a payroll tax of $50 is imposed on each firm, and that their respective outlays will now increase to $1,050. Consider next the case of firm A being relieved of its tax obligations and at the same time firm B's tax obligation being doubled. The outlay of firm A would now be once more $1,000 and the outlay of firm B would be $1,100. Firm A is now receiving a subsidy at the expense of firm B. To measure the value of this subsidy, it would seem appropriate to add to the actual outlay of firm A (standing for educational institutions) an imputed tax of $50 and to impute a deduction of $50 to firm B (standing for the rest of the economy).[8] Our calculation, therefore, will increase the educational outlay by the imputed value of the tax exemption and will decrease the outlay of the rest of the economy by a corresponding amount. This means that the value of one subcategory in the gross national product is raised and the value of another subcategory in the gross national product is lowered. Therefore, the value of the gross national product itself will not be affected by this operation.

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[6] The basic concept for the educational sector is really one of "gross factor income" rather than one of gross product. A governmental subsidy to the educational sector is, therefore, on a different footing from subsidies to other sectors of the economy.

[7] This imputation, however, is quite different from the imputation of value of, say, an agricultural product produced and consumed by farmers, which does not clear through the market. In the case of the farmer the value of output produced is greater than the one recorded by the market mechanism.

[8] If schools were required to pay State and local taxes, the tax rate could be lower than the one actually prevailing. Therefore to use the actually prevailing tax rate for an imputation of the subsidy schools are receiving in the form of this tax exemption exaggerates the magnitude of the subsidy somewhat.

Indirect costs.—The problems encountered in an attempt to calculate income forgone by students warrant some detailed discussion for three reasons: (1) The concept of "income forgone" is both statistically and also conceptually ambiguous and elusive, but, once accepted, calls for a major modification of the conventional national income framework; (2) any imputation of this kind, no matter how modest and conservative, is bound to affect significantly the aggregates for the Nation's outlay on education; (3) the discussion should clarify certain peculiarities about educational investment and economic growth, which may not be entirely obvious. The following discussion of the concept of income forgone is supplemented by a detailed explanation of the calculation of income forgone, in appendix B, and therefore the discussion here will be confined to analytical issues.

A distinction needs to be made between the income forgone by an individual student and by the total student population. The individual problem can be solved in *ceteris paribus* fashion if the requisite statistics are available. The income forgone by the entire student population constitutes a more difficult problem. Clearly, if the entire student body or a large portion of it were shifted into the labor market, the marginal product would fall. We simply do not know with any degree of accuracy what would happen if a large number of uneducated people were to be added to the labor market.[9] The problem leads to a paradoxical observation. It may be possible to achieve a much more accurate calculation of the income forgone by students for an underdeveloped country than for an industrially advanced country, in spite of the fact that the statistics are apt to be of poorer quality in the first than in the second case. In the underdeveloped country only a small proportion of the school-age population actually attends school, but in the advanced country the majority of the school-age population is in school. Thus a simple *ceteris paribus* calculation would be more accurate in the first than in the second case.

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[9] Because of these difficulties, one authority uses a flat maintenance allowance for the income forgone by students. P. J. D. Wiles in "The Nation's Intellectual Investment" (*Bulletin of the Oxford Institute of Statistics*, August 1956), p. 285, imputes for the United Kingdom as income forgone by students 15–18 years of age a maintenance allowance of £100, and £200 for students 18 and over.

The relevant marginal product here, however, would be a "long run" marginal product. This implies that the transfer of the students into the labor force would be anticipated and that capital equipment would be allowed to adjust accordingly. It also implies that capital resources and teachers now employed in the educational sector would be transferred out of the educational sector and would be added to the cooperating factors in other sectors of the economy.

See also Mary Jean Bowman, ch. 6, and Richard S. Eckaus, ch. 8 of this publication.

The concept of income forgone both for the individual student and for the students as a group is based on the notion that people at different levels of education have before them the alternative of continuing their schooling or of earning an income which is approximately equal to the income of others with similar educational attainment. If they choose the first alternative, they become, so to speak, self-employed. This notion is clear enough when applied to the individual. If, however, it is applied to the group, the meaning of certain educational requirements for certain jobs is much more difficult to interpret. Certain educational achievements may be a prerequisite for jobs, not because of the need of certain technical knowledge or the improved ability in learning processes because of past learning, but merely because employers rely on educational achievements as an index of native intelligence, curiosity, perseverance, and stability, or perhaps as an index of social status. To the extent, then, that educational achievement serves these purposes, the concept of income forgone becomes much more elusive. In this case much of education would really turn out to be without basic significance, except for the function of providing information; the private rate of return to education would be higher than the social rate of return.[10] To the extent that educational requirements do not fulfill any intrinsic need of the job, the social income forgone is greater than the private income forgone. There are indeed many highly skilled and very remunerative jobs, which require little formal education for efficient performance, although a high school or even college education is a prerequisite for many of them.

A transformation of society which would result in a large-scale diminution of the student body and an increase in the labor force would lead to an easing of many educational requirements. This trend then could counteract to a certain extent the decline of the marginal product resulting from a large influx into the labor force.

There remains the question of the proper treatment of the incidence of unemployment within the concept of income forgone. The issue is important for two reasons: (1) The incidence of unemployment is extremely high among young workers.[11] (2) It is not clear whether

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[10] Great external returns on education, such as the beneficial effect of educated parents on children and of an educated environment on the individual in general, have been discussed so widely that there is no need to go over this old ground here. We are dealing here with the one factor that may make the private rate of return higher than the social rate because it bears on the concept of income forgone.

[11] Theodore W. Schultz, in Capital Formation by Education, *Journal of Political Economy*, 68: 575, December 1960, cites the *Economic Report of the President, January 1960*, table D-18, which shows that in 1959 the total unemployed equaled 5.2 percent of the total employed, whereas for the group 14–19 years of age the percentage was 11.8.

Average unemployment rates among young people in the United States for October 1948 and October 1955 were: For those enrolled in school, age 14–17 years, 4.22 percent; age 18–24, 4.75 percent. For those not enrolled in school, age 14–17 years, 11.7 percent; age 18–24, 5.4 percent. Calculated from *Current Population Reports*, Series P-50, No. 64, Labor Force, January 1956, p. 2.

unemployment of this youngest group is a different phenomenon from unemployment among other segments of the labor force. Over 90 percent of the full time workers of high-school age live at home, and most of these have left school because of some adjustment problem in the school environment. In view of all this, there is a very strong presumption that their "intensity of jobseeking" is considerably below the "average intensity" which prevails among the rest of the labor force.

Schultz adjusts the income forgone by an allowance for unemployment according to an average rate of unemployment in the labor force. Certainly allowance should be made in some fashion for the incidence of unemployment when one is dealing with the income forgone on the part of the individual student.

In treating the notion of income forgone for the entire high-school and college student group, that is to say, with a potential additional labor force of about 10.5 million, we may work either within the framework of the real, imperfect world, or within a framework of an ideal, frictionless world, which allows us an approximate measure of the potential productivity of this addition to the labor force under ideal circumstances. Unless one assumes some ideal state of affairs, the whole notion of income and productivity forgone would become extremely hazy. I therefore propose to calculate the income or productivity forgone on the assumption of a frictionless world without unemployment. (See app. B.)

II. Scope of Calculation

The estimates given in this part of the chapter use the foregoing categories of cost, both direct and indirect, and include the imputed amounts for interest, depreciation, and taxes. The institutions represented in the estimates are public and private—elementary and secondary schools, colleges and universities, special schools for the mentally and physically handicapped, commercial vocational schools, and residential schools for exceptional children. The estimate also covers the costs of training programs for interns and residents in medicine, for Government executives, and for the military.

Executive training programs are included in the calculations only to the extent that these programs are conducted at universities and colleges. The cost of instruction would be shown as part of the budget of universities and colleges, but these figures do not show the total cost of these programs. They fall short of the salaries of the executives participating in them.

I have no statistics on internal executive programs. Most of these may be viewed as akin to upgrading and therefore should not be included. Others, however, like the IBM school, are formidable and by rights should be included.

The source of the data and the methods of estimating costs, which supplement the usual statistical data on educational outlays, are described briefly below. The section headings and items are numbered to correspond with the items in tables 1 and 2.

TABLE 1.—**The Nation's outlay on formal education, 1955–56 and 1957–58**

[In millions]

Type of institution	1955–56	1957–58
Total gross educational investment in people	$36,980	$44,539
Total direct costs (see below)	18,987	23,331
Total indirect costs (see below)	17,993	21,208
CURRENT COSTS, DIRECT	18,987	23,331
1. Public elementary and secondary schools	8,568	10,716
2. Private elementary and secondary schools	1,260	1,642
3. Commercial and vocational schools	196	223
4. Special residential schools	23	30
5. Public colleges and universities	1,324	1,712
6. Private colleges and universities	959	1,188
7. Imputed value of depreciation and interest:		
Elementary and secondary schools, public	1,912	2,392
Elementary and secondary schools, private	288	352
Colleges and universities, public and private	712	846
8. Imputed value of property tax exemption:		
Elementary and secondary schools, public	795	835
Elementary and secondary schools, private	120	132
Colleges and universities, public and private	300	335
9. Imputed value of sales tax exemption	8	8
10. Imputed costs of books, supplies, and travel:		
High school students (5 percent)	561	676
College and university students (10 percent)	614	702
11. Special defense programs, exclusive of basic training	1,100	1,100
12. Other direct costs, Federal	247	342
CURRENT COSTS, INDIRECT	17,993	21,208
13. Earnings forgone by high school students	11,211	13,519
Earnings forgone by college and university students	6,139	7,024
14. Earnings forgone by medical interns and residents	143	165
15. Military pay to students	500	500

TABLE 2.—**Gross total educational investment in people and physical facilities, 1955–56 and 1957–58**

[In millions]

Physical facility	1955–56	1957–58
Total	$40,422	$48,959
Total investment in people:		
1–15. Current costs, direct and indirect [1]	36,980	44,539
Total capital outlay for plant expansion	3,442	4,420
16. Elementary and secondary schools	2,748	3,290
17. Colleges and universities	686	1,122
18. Public institutions for delinquents	8	8

[1] See table 1.

CURRENT COSTS, DIRECT

1. *Public elementary and secondary schools.*—The data on these schools, from the U.S. Office of Education's *Biennial Survey of Education in the United States, 1954–56*, chapter 1, table 9, do not include expenditures for auxiliary services such as transportation and school lunches. The schools for which the information is reported do not include Federal schools for Indians, nor Federal schools on Federal installations, nor residential schools for exceptional children. For data on the residential schools, see 4 below.

2. *Private elementary and secondary schools.*—The figures are from the same source as those for public elementary and secondary schools. They are estimated by the Office of Education on the basis of expenditures per pupil in public schools.

3. *Commercial vocational schools.*—Only a very rough estimate can be made of the gross output of commercial vocational schools, based on the number of these schools and on their payrolls, reported under the State unemployment insurance program. A recent vocational training directory[11] lists 7,300 such schools. In 1955–56 their total payrolls amounted to over $85 million, exclusive of payrolls of 720 beauty-operator and barber schools, which are grouped differently in the Standard Industrial Code. A large number of the commercial vocational schools teach accounting and secretarial skills (1,260). In addition, the directory includes flying schools (475); schools of art, music, drama, and related subjects (400); nursing schools, schools for medical technologists not affiliated with universities (3,800); and mechanical and technical schools (630). Some of the students in art schools and flying schools undoubtedly engage in these programs for recreation. For these students the educational outlay constitutes consumption outlay rather than investment. Quantitatively, however, students taking these courses for recreation constitute an insignificant number, and no special allowance needs to be made for them.

The gross output for these schools may be approximated by deriving the equivalent of a gross sales figure on the assumption that a rough correspondence exists between the budgets of the commercial vocational schools and those of the public schools. In 1955–56 the current costs of public schools were divided as follows: instruction and administration, 71.2 percent; operation, 9.1 percent; maintenance, 3.9 percent; school transportation, 4.3 percent; other school services, 5.1 percent; and fixed charges, 6.4 percent. If we assume that in addition to the over 70 percent instructional and administrative costs about half of the noninstructional costs are made up of various labor costs, the total labor costs approximate 85 percent. The $85 million payroll of the commercial vocational schools accordingly would represent 85 percent of the current budget of those schools—a total current cost of $100 million in 1955–56. To this amount is added $60 million for imputed costs; items comparable to those included for public schools, making a total of $160 million for 1955–56.

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[11] Nathan M. Cohen. *Vocational Training Directory of the United States.* Arlington, Va., Potomac Press, 2d ed., 1958.

We have no payroll data for the barber and beauty operator schools. If we use the average gross sales of the commercial vocational schools for which we have payroll data to impute gross sales for the barber and beauty operator schools, schools which account for about 10 percent of the total number of schools, the aggregate commercial vocational school figure would be raised by 10 percent, or to $176 million, including imputed cost items for 1955–56.

It was assumed that in 1955–56 the $12 million payroll of the commercial correspondence schools amounted to 60 percent of their gross sales and thus we obtained a total of $20 million for those schools; and a total of $196 million for the combined gross sales of the commercial vocational and correspondence schools. The same procedure was followed in deriving the estimates for 1957–58. As this item is a relatively small one, the substantial margin of error to which the estimate is subject would not affect our overall findings.

4. *Special residential schools.*—There are three possible methods of handling the costs of residential schools for physically or mentally handicapped children and for delinquents: (*a*) complete inclusion of all costs of operation of such schools, (*b*) complete exclusion of these costs,[19] (*c*) inclusion of the costs that may be roughly classified as instructional costs. I have chosen method (*c*) because I believe it takes into account all relevant educational outlays while omitting other costs such as cost of medical care.

Assuming that the average current cost per student in residential schools for exceptional children is similar to that in ordinary public schools ($294.22 in the school year 1955–56, according to the *Biennial Survey of Education in the United States, 1954–56*, ch. 2, p. 110), we multiplied that cost by the number of students in the residential schools in that year—80,000—and thus obtained $23 million as the estimated expenditure for these schools in 1955–56. In 1957–58 the average current cost per student was $341.14, and the number of residential-school students 86,500—an approximate expenditure of $30 million in that year.

5. *Public colleges and universities.*—Data for the academic year 1955–56 on current educational and general expenditures of publicly

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[19] This is the method followed by one authority in the most recent and comprehensive study on educational expenditures in Great Britain. John Vaizey. *The Costs of Education.* London, George Allen & Unwin, 1958. p. 19.

controlled colleges and universities are from the *Biennial Survey of Education, 1954–56*, chapter 1, table 56, and exclude the amount expended for organized research.

6. *Private colleges and universities.*—Data on privately controlled colleges and universities are from the same source as the data on the publicly controlled ones and also exclude the amount expended for organized research. (For both public and private colleges and universities, organized research expenditures came to $506 million for 1955–56.)

7. *Imputed value of depreciation and interest.*—Figures on the original value of school property in the United States in the school year 1955–56 (*Biennial Survey of Education*, ch. 2, p. 24) and in 1957–58 (estimated) are as follows:

Type of institution	1955–56	1957–58
	In billions	
Public elementary and secondary schools	$23.9	$29.9
Public and private colleges and universities	8.9	11.2
Total	32.8	41.1

To determine the distribution of physical assets of public elementary and secondary schools, Schultz calculates depreciation and implicit interest by Rude's method.[14] [15] He calculates that 20 percent of their assets are in land, 72 percent in buildings, and 8 percent in equipment. There is no depreciation in the value of land. The depreciation of buildings is calculated at 3 percent per year. Although buildings are assumed to have a lifespan of 50 years, a period that would warrant only 2 percent depreciation, 3 percent is imputed to that factor to make some allowance for obsolescence due to population shifts. Ten percent depreciation is imputed to equipment; to this is added implicit interest of 5 percent—a total of 8 percent for depreciation and implicit interest.

Figures on depreciation and interest for private elementary and secondary schools have been estimated by Vladimir Stoikov of Princeton University.[16] He estimates property values of private schools in the United States in 1955–56 at $3,600 million, and the implicit rent of these properties at $288 million. Adding outlays for school plant in the next biennium, he estimates implicit rent on private schools at $352 million for 1957–58.

For colleges and universities, Schultz imputes only 2 percent for depreciation of buildings; but since, on the other hand, the asset distribution in land, buildings, and equipment is 15 percent, 70 percent, and 15 percent, respectively, the overall interest rate for depreciation and implicit interest again comes to 8 percent.

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[14] Theodore W. Schultz, op. cit., p. 579.

[15] Robert Rude, "*Assets of Private Nonprofit Institutions in the United States, 1890–1948*," National Bureau of Economic Research, April 1954 (unpublished).

[16] Unpublished figures.

8. *Imputed value of property tax exemption.*—Harris estimates the replacement value of real estate used by colleges and universities in the United States at $20 billion, compared with the original cost of $9 billion.[17] Imputing 1.5 percent for property tax exemption, the value of the exemption is estimated at $300 million. Applying this estimate to public elementary and secondary school real estate, I obtained a replacement value of $53 billion and a 1.5-percent imputed property tax of $795 million. Similar computations on 1957–58 data, including additions to plant in the period 1956–58, indicate a replacement value of $59 billion for elementary and secondary schools and $22.3 billion for colleges and universities, which at a 1.5 percent rate suggests a property tax exemption of $885 million for elementary and secondary schools and $335 million for colleges and universities. According to Stoikov's estimates for the replacement costs of value of real estate used by private elementary and secondary schools, previously mentioned, the value of the property tax exemption for these schools is $120 million for 1955–56 and $132 million for 1957–58.

It will be noticed that depreciation and interest are imputed on original cost, but imputed property taxes on replacement value. This procedure corresponds to that used in the Department of Commerce's national income statistics.

9. *Imputed value of sales tax exemption.*—A small additional amount is included as the value of sales tax exemptions; the figures, though approximate, indicate the general order of magnitude of the value of this tax exemption.

10. *Imputed costs of books, supplies, and travel.*—The costs of books, supplies, and travel to and from school were calculated according to the procedure used by Schultz. Expenditures for these items were estimated at 5 percent of earnings forgone for high-school students and 10 percent for college students.

11. *Special defense programs, exclusive of basic training.*—The defense budget of the United States, running well over $40 billion, is so large that even a small proportion of this spent on training and education would, by inclusion or exclusion, affect the aggregate figures significantly. Therefore, the nature of defense expenditures on training and education needs to be discussed. (The Biennial Survey of Education makes explicit allowance only for the Service academies.)

The problem here is somewhat different from the one that concerned Kuznets in his study of the Nation's output during a war period.[18]

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[17] Seymour E. Harris. "Broad Issues in Financing." In *Financing Higher Education, 1960–70.* New York, McGraw-Hill Book Co., 1959. p. 35–78.

[18] Simon Kuznets. *National Product in Wartime.* New York, National Bureau of Economic Research, 1945. p. 7.

Kuznets was concerned with the military output during a period of actual war, when no significant portion of productive factors, including labor ("personnel"), once absorbed by the military sector of the economy, is released to the civilian sector, even though those factors may be useful to it.

The problem here is one of a peacetime economy with a large military budget where personnel is periodically released from the Armed Forces to the civilian sector. Skills acquired during military training, such as pilot and mechanic training, can be put to civilian use, although their transferability is rarely complete. A study conducted by the Air Force in 1955 showed that of 5,000 enlisted men with a great variety of skills, separated from the service in 1950, 17 percent held jobs related to their Air Force experience.[19] Moreover, as I have suggested earlier, the cost of all formal education that contributes anything to later professional advancement should be included in our calculations if possible. Military training schools, even if they have no "usefulness" to the civilian sector, fall into this category.

Even if one were to ignore the problem of consistency, a decision to exclude all military training expenditures from our calculations would merely invite a new set of problems and paradoxes. Much education that takes place in the civilian sector and eventually leads to increased "civilian earning capacity" is actually geared—under the prevailing conditions of a large military budget—to the requirements of military production. This suggests that exclusion or inclusion of educational outlays merely on the basis of military or civilian supervision and budgeting would be arbitrary.

The cost of all military training programs is included with the exception of basic training, because under the conditions of a peacetime military draft, basic training is a compulsory requirement and does not add to a person's earning capacity. On the other hand, participation in additional education and training programs is not compulsory in the same manner as basic training and also tends to increase the income of participants.[20] The estimate also covers the pay of personnel while attending school.[21]

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[19] Harold Wool, "The Armed Services as a Training Institution" in Eli Ginzberg, ed., *The Nation's Children*, vol. 2, Development and Education. New York, Columbia University Press, 1960.

[20] This treatment is arbitrary in two respects: In a society with a strong ideal of a soldier citizen and of martial virtues, basic training would have to be viewed as an integral part of "formal education," even though not "productive" in a pecuniary sense, and would constitute merely an extreme case of divergence between cost and productivity. Moreover, basic training is a necessary prerequisite for participation in more advanced military educational programs, whose costs are included here.

[21] It has been impossible to devise a formula that would allow for "procurement" cost or "attrition" of equipment used for training purposes or to calculate depreciation of military training installations. My figures for military educational programs therefore fall short by a substantial amount.

Since the outlays for these military educational programs are actually substantial, statistics may be cited to illustrate the importance of these programs within the military framework and also to the civilian sector of the economy. There are approximately 400 specialties for enlisted personnel in the Navy and the Marine Corps, and more than 300 in the Army. Some historical trends in changes in military skills can be observed from table 3.

TABLE 3.—Percentage distribution of enlisted jobs, by major occupational group[1]

Major occupational group	Percent of enlisted jobs		
	At end of World War II	During Korean Conflict	Dec. 31, 1958
Electronics	6.2	9.6	13.5
Other technical	6.9	6.9	7.4
Mechanics and repairmen	21.3	22.6	25.8
Administrative and clerical	15.3	20.8	20.6
Crafts and services	26.7	22.7	19.4
Ground combat	23.6	17.4	12.9

[1] Source: Wool, The Armed Services as a Training Institution, *The Nation's Children*, vol. 2, Development and Education, Harold Eli Ginzberg, ed., New York, Columbia University Press, 1960, p. 166.

An important feature shown by this table is the steady decline of the relative importance of the category "Ground combat" and the increasing importance of "Electronics." As to the number of men involved, the following figures may be cited: in 1955 alone, 430,000 men received training in civilian-type specialties (this excludes training in purely military skills, flying training, and professional training of officers).

The figures shown, which were obtained from the Office of the Secretary of Defense, represent "current cost of education," as well as costs of food, clothing, and medical care of students, and so forth. Some of these items are "fringe benefits" of military service. A portion of these should be shown actually under indirect costs rather than under direct ones, but this breakdown cannot be effected; and the present breakdown does not distort the aggregate results. The figures for the armed services are those for 1959, as 1955–56 and 1957–58 data were not available, but the 1959 outlay does not differ drastically from the figures for those earlier years.

12. *Other Federal direct expenditures on training and education.*—A substantial number of educational and training programs are carried on by various agencies of the Federal Government, and the costs of operation of these programs are included to the extent that the figures are available.

Some of the more important Government educational outlays are for: education of dependent children overseas; for education of American Indians in Federal schools; for distribution of Federal surplus property to educational institutions; for apprenticeship programs; for safety training in mines; and for education programs in Federal correctional institutions.[22]

CURRENT COSTS, INDIRECT

13. *Earnings forgone by high school and by college or university students.*—Earnings forgone by high school and college or university students are based on a number of empirical studies of the actual earnings of the school-age population in different periods. For 1955–56, the estimate derived is $1,456 per high school student and $2,099 per college or university student (see app. B). Applying to these estimates the 4.39-percent rise in average gross earnings in all manufacturing industries between 1956 and 1958, the average earnings forgone per high school student in 1957–58 was estimated at $1,519, and the average, per college or university student, at $2,139.

When these figures are multiplied by the number of high school students (7.7 million in 1955–56 and 8.9 million in 1957–58) and by the number of students in colleges and universities (2,996,000 in 1955–56 and 3,284,000 in 1957–58), the estimates are derived of the total earnings forgone. The earnings forgone by high-school students are estimated at $11,211 million in 1955–56 and $13,519 million in 1957–58. For college and university students the resultant estimates are $6,139 million in 1955–56 and $7,024 million in 1957–58.

14. *Earnings forgone by medical interns and residents.*—Although my calculations allow for the income forgone by medical interns and residents, they do not allow for other training programs for certification, such as the programs for certified public accountants, mechanical engineers, and architects because they are on a different footing. Such programs are not comparable to the programs for medical interns and residents because they are not requirements in the sense that interning is for a medical career. Apparently because of this, there exists no substantial income differential in those three fields between persons who take part in the special programs and those who do not.

On September 1, 1955, there were 9,603 persons serving medical internships in the United States. (This and the following figures, with one exception to be noted, are taken from the annual survey of such internships and residencies published by the American Medical Association.)[23] From this total, I substracted the number of graduates of medical schools in foreign countries who were interning in this country (1,809), leaving 7,744. Approximately half of these interns were serving in hospitals affiliated with medical schools and were receiving an average monthly cash stipend of $121. The other half, in nonaffiliated hospitals, were receiving an average monthly cash stipend of $169. The average of the two is $145.

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[22] Such programs are discussed in *Federal Funds for Education 1958–59 and 1959–60* (U.S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1961, No. 14).

[23] Graduate Medical Education in the United States. *Journal of the American Medical Association*, 162 : 277–290, Sept. 22, 1956.

About 8 out of each 10 hospitals provided full maintenance for interns in addition to the stipends, and almost all of the remaining provided partial maintenance. I valued maintenance at $120 per month, taking into consideration the fact that a small number of hospitals provided no maintenance.

Adding the monthly cash stipend to the value of the maintenance, a figure of $265 was obtained as the average intern's income per month, or about $3,180 per year.

To obtain the income forgone by the intern, I subtracted this figure, $3,180 from $4,921—an estimate of the yearly income of a person with equivalent training—an estimate based on the median salary in the academic year 1955–56 for 9 months of teaching at the assistant-professor level.[24]

I increased this figure by $1,300 to take account of the 3-month summer session and then added 10 percent to represent the difference between salaries in academic and nonacademic jobs, and arrived at a total of $6,843. Subtraction from this total of the average income earned in a year gave $3,663 as the average yearly income forgone by the interns. This figure was then multiplied by the number of interns, 7,744, to give the total income forgone—$28.4 million. (The 1957–58 figure is an adjustment of the 1955–56 estimate to allow for the change in the number of interns between the two periods.)

The income forgone by medical residents was calculated by a method parallel to that used for interns. On September 1, 1955, there were 21,425 individuals serving residencies in the United States. From this figure we subtracted 4,174, the number of residents from foreign countries, leaving a total of 17,251 residents. Resident programs (surgery, internal medicine, etc.) were grouped in eight income classes and the number of programs were distributed in roughly normal fashion among the classes.[25] If we assume that the residents also are normally distributed (an assumption that is certainly open to question), then we may take the midpoint of the distribution, or

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[24] This estimate was obtained through a study of 772 institutions, reported in "Salaries in Higher Education," *NEA Research Bulletin*, 36: 90–95, October 1958, published by the National Education Association.

[25] All information on residencies is quoted from "Graduate Medical Education in the United States," op. cit., and another article with the same title, giving more recent figures in the *Journal of the American Medical Association*, 171: 665–674, Oct. 10, 1959.

$250, as our estimate of the average stipend paid to residents. To this figure we add $100, representing the value of maintenance. This maintenance value is somewhat lower than that for interns, since only 56 percent of the hospitals provided full maintenance for residents and 25 percent partial maintenance.

The average monthly income of the residents, then, was calculated as $350, and the average per year was $4,200. The estimate of the total income forgone by the residents was based on the reported net income in 1949 of general practitioners in the United States under the age of 35—$9,054.[26] (This is the most recent information I have found in which income is given by age.) Incomes of general practitioners are now at least 20 percent higher than they were in the early fifties,[27] and I therefore increased the 1949 figure by 20 percent, finding a net annual income for general practitioners under 35 years of age of $10,865. From this figure I subtracted my estimate of medical residents' income, $4,200, to obtain the actual income forgone by residents. I then multiplied this final figure, $6,665, by the number of residents and arrived at $115 million. If we add to this figure the figures previously obtained for income forgone by interns, $28 million, we get a grand total for income forgone in medical education of $143 million.

15. *Military pay to students.*—Information on military pay in 1959 was obtained from the Department of Defense. My calculations are based on pay averages for 18,000 officers and 121,000 enlisted men, constituting the average annual number of students. The figures do not include any military reserve programs or schools. The pay of student military personnel is included here because they are withdrawn from other tasks while in school but continue to receive the same pay.

CAPITAL OUTLAY FOR PLANT EXPANSION

16. *Elementary and secondary schools.*—Data on expenditures for plant expansion of elementary and secondary schools in the academic year 1955–56 are quoted from the *Biennial Survey of Education, 1954–56*, chapter 1, table 9. For 1957–58, comparable data, unpublished, are quoted from tabulations prepared by the Office of Education for the *Biennial Survey of Education, 1956–58.*

17. *Colleges and universities.*—Data on expenditures for plant expansion of colleges and universities in the academic year 1955–56 are quoted from the *Biennial Survey of Education, 1954–56*, chapter 4,

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[26] William Weinfeld, "Income of Physicians, 1929–49," *Survey of Current Business*, vol. 31, July 1951, U.S. Department of Commerce, p. 9–26.

[27] Wallace Croatman, "Are You Better Off Than the Typical G.P.?" *Medical Economics*, 34: 28, April 1957.

table 2. For 1957–58, comparable data, unpublished, are quoted from tabulations prepared by the Office of Education for the *Biennial Survey of Education, 1956–58.*

18. *Public institutions for delinquents.*—Data on capital expenditures for institutions for delinquents are quoted from Robert L. Rowland, *Statistics on Public Institutions for Delinquent Children, 1956.* Statistical Series No. 48, 1958 and No. 59, 1960. Children's Bureau, Social Security Administration, U.S. Department of Health, Education, and Welfare.

No figures are available at present on capital outlay for education programs carried out by the Armed Forces. Therefore the total calculated for capital outlay for plant expansion does not include such outlay.

III. Findings and Concluding Observations

The Nation's total investment in people through education for the academic year 1955–56 is estimated at $37.0 billion, and for 1957–58 at $44.5 billion (table 1). When capital outlays for school and college plant are added, these sums are increased to $40.4 billion and $49.0 billion, respectively (table 2).

Current costs of education are divided about equally between direct and indirect costs in each of the years. The earnings forgone of high-school students more than equals the total direct institutional costs of public elementary and secondary schools. Earnings forgone of college students by far exceed the direct costs of colleges and universities. Direct institutional expenditures of the colleges and universities totaled $2.3 billion in 1955–56 and $2.9 billion in 1957–58. If we add to these direct institutional expenditures the imputed depreciation and interest and the value of property tax exemptions, the amounts are increased to $3.3 billion and $4.1 billion. Earnings forgone of college and university students are estimated at almost double these amounts, or $6 billion for 1955–56 and at $7 billion for 1957–58.

What share of our national resources does investment in education claim? As was suggested earlier, the conventional gross product estimates are not wholly adequate to permit a direct answer to this question without first adjusting gross product figures to reflect the imputed educational cost items (table 4). The adjusted estimate is 5 percent higher than the conventional gross national product estimates. Educational investment in human beings amounted to 9.6 percent of the adjusted gross national product in 1957–58 and 8.6 percent in the biennial year immediately preceding. When the costs of plant expansion are added, the share of resources devoted to education is increased by an additional 1 percent; for example, for 1957–58 from 9.6 percent of the adjusted gross national product to 10.6 percent.

The investment in education may be viewed in still another way, namely, as a share of the total gross investment, both public and private. Table 5 summarizes these estimates and indicates the items that may be added to the conventional gross private domestic investments to arrive at a more inclusive approximation of investments, including both direct expenditures and the opportunity costs of investment in education. The national total thus arrived at for the academic year 1955–56 is $129.9 billion, of which $65.3 billion is the gross private domestic investment, $27.6 billion the gross public investment, and $37.0 billion the direct and indirect costs of education as an investment in people.

In 1955–56 and also in 1957–58, we were investing about 30 percent of our gross national product (as adjusted) for future growth. In more customary national-product accounting, private investment is shown as about 16.0 percent of the national gross product, and public and private investment at 22.7 percent. Educational investment is equal to about one-third of the total investment. This makes it probably the largest single component of all investment in the United States.

TABLE 4.—Gross national product, adjusted to compute share devoted to formal education

[Amounts in billions]

	1955–56	1957–58
Gross national product (in national accounts)	$408.7	$410.7
Add: Depreciation on school property, and interest paid on such property ¹	2.9	3.6
Deduct: Interest paid on school loans (included in annual cost)	.2	.3
Add: Income forgone:		
High school students ¹	11.2	11.5
College and university students ¹	6.1	7.9
Medical interns and residents ¹	.1	.2
Adjusted gross national product	428.8	433.7
Educational expenditures, direct and indirect:		
Amount	37.0	41.5
Percent of adjusted gross national product	8.6	9.6

¹ See table 2 for estimates of depreciation and interest and for income forgone.

Source: Gross national product estimates from Department of Commerce, Survey of Current Business, July issues. Figures are for the quarters October through September of the designated years.

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TABLE 5.—Gross private and public investment, adjusted

[In billions]

Type of investment	1955-56	1957-58
Total gross investment as adjusted for educational investment	$129.9	$133.3
Gross private investment (conventional accounts)	65.3	61.1
Gross public investment (conventional accounts)[1]	27.6	27.7
Gross educational investment (adjustment)	37.0	44.5
Current costs, direct[2,3]	19.0	23.3
Income forgone, indirect[2]	18.0	21.2
	Percent	
Gross educational investment as a percentage of total gross investment (adjusted)	28.5	33.4

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[1] Francis M. Bator. *The Question of Government Spending.* New York, Harper & Bros., 1960. p. 156, table 23.

[2] See table 1. In addition to the three types of income forgone listed in table 4, military pay to students has to be subtracted here.

[3] The addition of the [illegible] property tax and sales tax exemption is, strictly speaking, incorrect. If these taxes were shifted to the educational sector, other taxpayers would have to pay so much less. Part of these taxes could be shifted away from consumption outlays and part of them could be shifted from private investment expenditures. To the extent that the latter would take place, we would have merely an intrasectional shift in the investment sector and to that extent the figure is exaggerated.

Part III

FINANCIAL
RESOURCES FOR
HIGHER EDUCATION

CHAPTER 11

Student Higher Education and Facilities of Colleges and Universities: Projections

*Selma J. Mushkin and W. Robert Bokelman**

I. Expenditures and Income of Colleges and Universities for "Student Higher Education," 1970–75

PROJECTIONS OF EXPENDITURES by colleges and universities for "Student higher education"[1] and of the institutions' sources of income for that purpose are presented here as a backdrop for subsequent chapters on financing of higher education. The projections reflect the estimator's judgment of the amounts required, under the conditions assumed, to assure educational opportunities for the increasing number of talented young people in this country and to permit the colleges and universities to discharge their greatly enlarging responsibilities.

The underlying assumptions and the computations based upon them are presented in summary form below. Projection for a decade and even longer is necessarily an adventure into the unknown. The estimates presented are derived from and consistent with the assumptions made. Under conditions other than those assumed, college and university finances would develop differently in detail, and perhaps in broad outlines.

STUDENT ENROLLMENTS

Total enrollments, reported in the Office of Education's series on fall enrollments of degree-credit students, are projected on three different bases by Conger (ch. 1 of this publication). His projections for aggregate United States are summarized in table 1 below.

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*Pt. I of this chapter was prepared by Selma J. Mushkin, economic consultant for the Division of Higher Education, and pt. II by W. Robert Bokelman, Chief of the Business Administration Section, College and University Administration Branch, Division of Higher Education, U.S. Office of Education.

[1] Student higher education represents essentially teaching costs and "overhead" costs allocable to teaching. In the terms of the Office of Education's expenditure definitions, student higher education includes costs of instruction and departmental research, and that portion of expenditures for general administration, libraries, and physical plant allocable to instruction. It excludes from the amount for total educational and general expenditures those expenditures for organized research and overhead connected with such research and expenditures related to other organized noninstructional activities.

TABLE 1.—Enrollments, fall 1957 and 1960, in colleges and universities, aggregate United States; and 3 illustrative estimates of enrollments, 1970 and 1975

[In thousands]

	1957	1960	1970	1975
Actual	3,068	3,610		
I. Trend projection			7,067	8,677
II. Pattern attainment projection			6,061	7,140
III. Constant-rate projection			5,241	5,992

The three enrollment projections form the basis of the illustrative estimates developed here of expenditures by colleges and universities for student higher education and of sources of income.

The long-term trend toward greater expansion in public institutions than in private institutions, it is assumed, will continue. For purposes of the estimates it is assumed that two-thirds of the enrollment increase between the academic years 1957–58 and 1970–71 and 70 percent of the additional expansion between 1970–71 and 1975–76 would occur in publicly controlled colleges and universities.[2] An alternative assumption of a uniform increase in enrollments in both public and private colleges would change the estimates very little. Similarly, a somewhat higher rate of expansion in enrollment in public institutions than that assumed here would not change the estimates markedly.

GENERAL ASSUMPTIONS

Salaries paid to faculty and others employed by colleges and universities and costs of equipment, books, scientific instruments and apparatus, heating, and so forth, necessarily are influenced by trends in general employment and in price and earnings. Income received by colleges and universities is perhaps even more directly affected by such trends. It is assumed in the projections presented here that the economy will continue to grow in the period ahead and that a high level of employment will be maintained, with a maximum rate of 4 percent unemployment.

The 1970 and 1975 projections assume that output per person employed will increase at the historical trend rate of 2 percent per annum; that the labor force will grow at 1.7 percent per annum; and that price rises will average 1.4 percent per annum.[3]

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[2] See Selma J. Mushkin, ch. 14, for discussion of changes in the proportion enrolled in public and private colleges and universities during the 1950's.

[3] Combining a single estimate of labor force growth with three estimates of college enrollments (with a spread of about 1.8 million between the "low" and "high" enrollment estimates) implies different definitions of "full employment." A single gross national product figure was used for simplicity of presentation, but it should be recognized that larger college enrollments may, in a single year period, reduce the potential gross national product, at full employment levels.

These assumptions and the estimates of gross national product parallel those presented by the President's Council of Economic Advisers before the Joint Economic Committee of the 87th Congress. The estimated figures on the gross national product for the years used in projecting expenditures for student higher education and the institutions' income are:

Year	*Gross national product (billions)*
1957	$445
1960 actual	504
Full employment level	535
1970	880
1975	1,130

EXPENDITURES FOR STUDENT HIGHER EDUCATION

The financial accounts of colleges and universities do not routinely provide a separate accounting of expenditures for each of their major functions—student higher education, research, and public services. For the purposes of this chapter, expenditures for student higher education are projected in more detail than are the other functions named. As used here, expenditures for student higher education include expenditures for instruction (and departmental research) and the portion of expenditures for general administration, libraries, and maintenance of physical plant that is attributable to instruction. Accordingly, from the category of expenditures typically reported in financial accounts, namely, "educational and general expenditures," the following items have been excluded: organized research, extension courses for nondegree students, other public services and related activities, and also the part of administrative, plant-operation, and library expenses that is attributable to organized research and public services. Expenditures for auxiliary activities, scholarship aid, and capital outlay are also excluded. Student higher education expenditures of colleges and universities as defined here are estimated at $2,364 million for 1957–58 for the aggregate United States. Educational and general expenditures, as reported that year, amounted to $3,634 million.

Student higher education expenditures in turn are divided into (*a*) personal service expenditures, and (*b*) expenditures for commodities or contractual services. The personal service component, which represents payrolls and fringe benefit outlays for persons employed by the colleges and universities, was computed at 75 percent of the total expenditure for student higher education.[4] The commodity and contractual service component represents the expenditures for books, apparatus and equipment, cleaning materials, heating, lighting, travel, and so forth.

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[4] This percentage represents the weighted average percentage of payrolls associated with instructional costs and of payrolls for all educational and general purposes. The weights used were: (*a*) instructional expenditures, and (*b*) other expenditures for student higher education, including expenditures for administration, plant maintenance, and libraries.

The amounts spent in the base year 1957-58 for student higher education and the illustrative estimates of expenditures for 1970-71 and 1975-76 are shown in table 2.

TABLE 2.—Expenditures for student higher education, colleges and universities, aggregate United States, academic year 1957-58; and 3 illustrative estimates of those expenditures, 1970-71 and 1975-76, according to enrollment projections

Academic year	[illegible] (thousands)	Expenditures (in millions): Total	Personal services component	Commodity and contractual services component
1957-58	3,108	$2,304	$1,713	$591
1970-71:				
Estimates:				
I	7,[illegible]	9,148	7,531	1,617
II	6,[illegible]	7,804	6,419	1,385
III	6,281	6,941	5,682	1,259
1975-76:				
Estimates:				
I	8,6[illegible]	12,462	10,316	2,146
II	7,3[illegible]	10,2[illegible]	8,5[illegible]	1,766
III	[illegible]	8,9[illegible]	7,4[illegible]	1,480

In the development of the expenditure estimates the wide differences among colleges and universities in educational programs and in staffing have not been taken into account; the institutional pattern of higher education is assumed to remain essentially unchanged. Geographic differences among institutions and differences in rates of growth have also been ignored, although there is evidence that some States—Arizona, California, and Florida, for example—have been experiencing a rate of increase in enrollments that is a good deal higher than that obtaining in other areas of the country. The techniques of projection used here deal with aggregates and nationwide averages, and probably conceal some important financial problems.

Expenditures for faculty and for other personal services.—The most important item in educational outlays necessarily is faculty salaries. A recent report by Committee Z of the American Association of University Professors states:

> If the economic status of the profession is unsatisfactory, the growing mass of students will nevertheless, somehow, continue to be taught. But what they will receive in the process will turn out to be no more than a caricature of an education. Of all products, education is one of the most easily diluted, and unless the academic profession is kept sufficiently attractive to gifted teachers and researchers, more or less unobtrusive adulteration will be the inevitable consequence.[5]

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[5] The Economic Status of the Profession, 1960-61: Annual Report by Committee Z. *AAUP Bulletin*, 47: 101, June 1961.

The President's Committee on Education Beyond the High School estimated in 1957 that average faculty salaries would have to be increased by 75-80 percent to restore teaching to a competitive position in the professional labor market, and that to maintain this position, once restored, would require additional increases. The Committee recommended doubling the average salaries in 5-10 years.[6] This recommendation has been widely broadcast, and the increase is generally accepted as a goal to strive toward.

The estimates of payroll expenditures of colleges and universities are computed so as to allow separately for (*a*) faculty and other college and university salary increases large enough to permit these positions to become more attractive and to compete effectively for the talents of gifted persons with alternative employment opportunities; and (*b*) sufficiently increased average salaries in the future to enable faculty compensation to hold its improved competitive position. The base year salary levels, accordingly, are computed to allow for a readjustment increase of 50 percent over 1957-58 average salaries. (It must be recognized that salaries increased by 15-20 percent during the period 1957-58 to 1960-61.) Although the 50-percent increase is admittedly an arbitrary figure, it corresponds to the increase that Harris estimates as required to restore the relative income status of full professors in outstanding universities to its position of the 1930's.[7] The base figure, adjusted for the 50-percent rise, is increased further to allow for a 2-percent-per-annum rise in the average productivity of all the workers in the civilian labor force and also for an assumed average rise in prices of 1.4 percent per annum. The allowance of 2 percent productivity gain per annum is made to retain the competitive position of faculty salaries, whether or not faculty productivity is increased. Thus in a sense the further assumption of an increase of 20 percent in student-faculty ratio for the academic year 1970-71 and of 25 percent for 1975-76 is independent of the salary increase used in the projections.

In the projections, staffs for instructional and administrative purposes were increased less than proportionately to enrollments for the academic years 1970-71 and 1975-76. The assumptions used in developing the staffing figures are based on those outlined by the Office of Education in a report on the future financial needs of higher education.[8] That report assumes that the number of staff members engaged in instruction and administration will rise with the increased enrollment, allowing, however, for a higher student-staff ratio during the decade of the 1960's of about 20 percent. The report says:

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[6] U.S. The President's Committee on Education Beyond the High School, *Second Report to the President*. Washington, D.C., July 1957. p. 6.

[7] Seymour E. Harris. Financing of Higher Education: Broad Issues, in *Financing Higher Education, 1960-70*, Dexter M. Keezer, ed. New York, McGraw-Hill Book Co., 1959. p. 71.

[8] U.S. Department of Health, Education, and Welfare, Office of Education. *Ten-Year Objectives in Education; Higher education staffing and physical facilities, 1960-61 through 1969-70*, Washington, D.C., 1961. p. 9.

> The 20 percent rise in student-staff ratios is assumed in spite of the likelihood that an increase in the proportion of graduate students and an increase in curricular diversities corresponding to continuing increase in knowledge would tend to produce a change in the other direction. A larger rise in the projected student-staff ratio could not, in our judgment, be assumed without building into the academic structure a planned reduction in quality of instructional service.[9]

In making the estimates presented here, a 20 percent rise in student-staff ratio is assumed to occur by 1970–71 and an additional rise of 5 percent in the period 1970–75. As a consequence of the combination of assumptions (the rise in productivity and price and the larger increase in staff relative to enrollment increases during the last 5 years of the projection compared with 1970–71), expenditures per student enrolled are higher in 1975–76 than in 1970–71.

Expenditures for commodities and contractual services.—Expenditures other than payroll costs are projected on the assumption of a growth in such expenditures proportionate to increases in enrollment, with a further allowance for an underlying general price rise. Although per-student expenses for library, administration, and other services may be reduced as a consequence of increased enrollment, and may therefore bring about lower costs per student, these savings would be offset by the higher costs accompanying new instructional methods, such as costs of equipment.[10]

SOURCES OF SUPPORT FOR STUDENT HIGHER EDUCATION

The major issue in this chapter is not whether we can afford to finance the projected expenditures in 1970–71 and 1975–76 (see table 2), but rather what the relative shares in the financing will be for students, governments, and private philantrophy, and how far the total approximation of projected incomes will go toward financing the required expenditures.

Base-year income distribution.—A preliminary step in the projection of income available to pay for student higher education is to approximate the amounts contributed by each of the several sources in the base year 1957–58. The sources of funds used for the three major functions of colleges and universities are not separately identified in the base data. However, reports from these institutions to the Office of Education provide data on their current income for "educational and general purposes"; these data exclude amounts received from auxiliary enterprises and those received for scholarships and other student aid. Funds designated for organized research are also separately identified and are excluded, and income from "organized activities relating to educational departments" is limited to the excess of this income over expenditures for these departments. With these adjustments a beginning can be made toward identifying the funds available for student higher education. The amounts estimated for 1957–58 for student higher education, by source of support, are shown in table 3.

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[9] Ibid., p. 9.

[10] John Dale Russell, in commenting on an early draft of this chapter, wrote: "I have a hunch that we shall be using more commodities per student and spending more for such services per student than in the past. We shall find many ways of enriching and improving the instruction of students through audiovisual aids, travel grants, better library facilities, etc. In the past we have been severely limited in budgeted expenditures for the kinds of teaching aids that research has shown to be highly advantageous. My own idea is that there should be a modest allowance for some increases in the kinds of commodities and services that will enable the colleges to do a more effective job of teaching students."

TABLE 3.—Current income for support of student higher education, by source, in colleges and universities, aggregate United States, academic year 1957–58

[In millions of dollars]

Source	Amount	Percent
Total	$2,363.9	100.0
Tuition and fees [1]	856.1	36.2
Gifts and endowment earnings [2]	346.8	14.7
State and local governments [2]	1,001.3	42.4
Federal funds [3]	95.5	4.0
Other [2]	64.2	2.7

[1] The amount of income from student tuition and fees as reported in Biennial Survey data for 1957–58 is $[illegible] million. [illegible] student fees set aside in plant funds, $21.1 million. [illegible] estimated at two-thirds of scholarship income, excluding [illegible] tuition, and $[illegible] million, the estimated amount [illegible] is deducted. See Richard Goode, ch. 17, [illegible] of the Biennial Survey adjustment.

[2] [illegible] proportionately reduced to correspond to the [illegible] and total income as reported in the Biennial Survey.

[3] Federal funds paid to colleges and universities, [illegible] for [illegible] research and for agricultural [illegible] represents a reconciliation of Biennial [illegible] Finance Section, Office of Education, [illegible] of Federal activities related to education [illegible] Department of Health, Education, and Welfare, Office of Education. It should be recognized that Federal funds in addition to the $95.5 million are spent for higher education, but that [illegible] for purposes other than student higher education, such as organized research, or are paid to [illegible] and not exclusively to the colleges and universities as Federal aid.

Tuition payments.—In the projections in tables 4 and 5, tuition per student enrolled in public and in private colleges and universities is increased as a first approximation in proportion to the increase in average family income, or at an assumed rate of 3.4 percent per annum—a rate consistent with the underlying general economic assumption. It is assumed, however, that the increase in the number of children in families in the future not only would somewhat reduce the college attendance (see Brazer and David, ch. 2 of this publication) but also would exert some downward pressure on tuition increases. Arbitrarily the estimated tuition payments were reduced by 10 percent to allow for the larger family size.

Gifts and endowment earnings.—Gifts to colleges and universities for "current income accounts" and earnings on endowments have increased considerably in recent years, but have declined relative to other sources. In projecting amounts received through gifts and endowment earnings, it is assumed that the pattern of growth evidenced in recent years would persist in the future. The growth in gifts and endowment earnings to more than $1 billion by 1970–71 and more than $1.3 billion by 1975–76, under illustration I, assumes essentially a sustained drive to stimulate giving by alumni, corporations, and others. The Council for Financial Aid to Education has estimated that such giving would increase by more than $1 billion during the 12-year period from the academic year 1957–58 to 1969–1970. Fund raising of this magnitude for current expenditures for student higher education alone will imply almost a tripling of gifts and endowment earnings in the next decade.

TABLE 4.—Current income of colleges and universities for student higher education, by source, academic year 1957–58; and 3 illustrative estimates of that income, 1970–71 and 1975–76

[In billions]

Source	1957-58	Estimate, by year, and illustration					
		1970-71			1975-76		
		I	II	III	I	II	III
Total	$2.4	$9.1	$7.8	$6.8	$12.5	$10.3	$8.6
Total 1st approximation of income		6.9	5.9	5.2	9.4	7.7	6.5
Tuition and fees	.9	2.6	2.2	2.0	3.7	3.1	2.6
Gifts and endowment earnings	.4	1.1	.9	.8	1.3	1.1	.9
State and local funds	1.0	2.9	2.4	2.1	3.8	3.1	2.6
Without tax rate increases	(1.0)	(2.0)	(2.0)	(2.0)	(2.6)	(2.6)	(2.6)
Other¹	.1	.4	.4	.3	.6	.5	.4
Additional amount needed		2.2	1.9	1.7	3.1	2.5	2.1

¹ Includes income from Federal Government, which amounted to $95.5 million in 1957-58.
Totals may not add because of rounding.

TABLE 5.—Percentage distribution of current income of colleges and universities for student higher education, by source, academic year 1957–58; and 3 illustrative estimates of that income, 1970–71 and 1975–76

Source	1957-58	Percent of estimate, by year and illustration					
		1970-71			1975-76		
		I	II	III	I	II	III
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total 1st approximation of income		75.7	75.6	75.5	75.3	75.3	75.2
Tuition and fees	36.2	28.6	28.3	28.5	29.6	29.9	30.2
Gifts and endowment earnings	14.7	11.7	11.7	11.7	10.5	10.5	10.5
State and local funds	42.1	31.3	31.0	30.7	30.5	30.2	29.8
Other¹	6.7	4.6	4.6	4.6	4.7	4.7	4.7
Additional amount needed		24.3	24.4	24.5	24.7	24.7	24.8

¹ Includes income from Federal Government.
Totals may not add because of rounding.

State and local governmental funds.—As a first approximation of the amounts of State and local funds made available for student higher education, these funds were projected on the basis of experience since 1950. State and local funds for this purpose per student enrolled in public colleges and universities remained relatively uniform from biennium to biennium. Over the whole period, these per student contributions increased on the average only 1.2 percent a year. Although these public funds are not exclusively used to finance public institutions, and the amount of State support of private institutions is growing, the historical data suggest a close parallel between the growth in public funds and in the number enrolled in public institutions. State and local funds accordingly are projected to rise in proportion to the number of students enrolled in public colleges and universities, with an added adjustment corresponding to the average increase in per student funds over the period since 1950. The figures thus computed are compared with the amounts that State and local governments will raise for student higher education if their tax effort remains at the 1957–58 level.

Several studies of State and local finance suggest that State and local tax bases can be expected to expand roughly in proportion to increases in the gross national product. Accordingly, there would be a 1-percent increase in tax base for each 1-percent rise in the gross national product. The growth in the economy would increase the $1 billion contributed in 1957–58 by State and local governments for student higher education to $2 billion by 1970–71 and $2.6 billion by 1975–76. A large share of the State and local funds estimated in the illustrations shown in table 4 could be raised without imposition of new State and local taxes or increases in rates of existing levies. There is every indication that States and localities have increased their support of institutions of higher education more than proportionately to the expansion of the economy in the past, and further increases may be anticipated, calling for greater tax effort.

Other sources.—For the purpose of arriving at a first approximation of the projected amounts of college and university support from sources other than those already discussed, Federal Government funds and other miscellaneous amounts of income are increased in proportion to the estimated increase in the gross national product and adjusted by an index of enrollment increases to reflect the differences in fund requirements arising from the different levels of enrollment projected.

Total first approximation of incomes and additional amounts needed.—As a basis for projecting an approximation of the *total* income available for student higher education in 1970–71 and 1975–76, as shown in tables 4 and 5, the various sources of funds now used have been projected, as indicated earlier, on the assumption that tuition charges will be increased in proportion to the rise in family incomes; that States and local governments will continue to make at least as great a tax effort for student higher education as they have in the past; and that other funds for that purpose, both private and public, will be enlarged in amounts consistent with the growth in the national economy and with past trends.

No change in the basic structure of financing has been assumed in determining the total first approximation of amounts of income available by source of funds. However, some change in the structure of financing is needed, as is indicated by the additional sums required to finance the total costs of student higher education (tables 2 and 4). These requirements will presumably have to be met through greater efforts by individuals and by private and public agencies if the quality of education is not to be impaired.

ESTIMATED TOTAL EDUCATIONAL AND GENERAL EXPENDITURES

In table 6 projected expenditures of colleges and universities for student higher education are combined with estimates of research expenditures in these institutions and with rough allowances for their public service outlays to provide estimates of total educational and general expenditures for 1970-71 and 1975-76.

The projected increases in expenditures of colleges and universities patently will require substantial increases in their income. However, economic growth will enlarge the resources available for this financing; the gross national product by 1975 will exceed $1 trillion if our stock of manpower and equipment is fully utilized. Out of the enlarged income flow, the country can well afford to finance higher education for the growing number of students. As a Nation, we can

TABLE 6.—Educational and general expenditures of colleges and universities, academic year 1957-58; and 3 illustrative estimates of these expenditures, 1970-71 and 1975-76

[In billions]

Function	Expenditures, by year		
	1957-58	1970-71	1975-76
Total educational and general	$3.6	$11.1-$14.3	$15.3-$21.2
Student higher education [1]	2.4	6.8- 9.1	8.6- 12.5
Research [2]	.8	3.5- 4.4	5.7- 7.5
Public services and other organized activities [3]	.4	0.8- 0.8	1.0- 1.2

[1] See table 2 and accompanying text for discussion of estimates and underlying assumptions.

[2] Estimates of research outlays are those presented by Herbert Rosenberg in ch. 18 of this publication.

[3] Assumes a rate of increase proportional to gross national product for outlays between 1957-58 and the 1970's.

ill afford to fail to commit the resources and funds required to fulfill our national manpower needs for professionally trained people. The highest of the estimates of student higher education expenditures presented here calls for an increase from one-half of 1 percent of gross national product in 1957–58 to 1.0 percent by 1970–71 and 1.1 percent by 1975–76. The highest of the estimates of total educational and general expenditures calls for an increase from 0.8 percent of gross national product in 1957–58 to 1.6 percent by 1970–71 and 1.9 percent by 1975–76.

II. Needs for Facilities, 1961–75

Several important factors contribute to the critical need for expansion of physical facilities for institutions of higher education. A larger college-age population is a certainty. There is every reason to believe that a continually increasing proportion of college-age youth will seek a college education and will remain longer in order to earn more advanced degrees. Also, the vastly increased emphasis on advanced study and research calls for new, costly equipment and other facilities not formerly required in many institutions of higher education. These evidences of increased need, plus a backlog of obsolete and temporary buildings in need of replacement and repair, form the basis for the projection of needed physical facilities as set forth in this chapter.

To what extent rising costs will be offset in the future by the development of less costly construction materials and techniques and better utilization of present plant facilities (sometimes brought about through academic and instructional reorganizations) is difficult to assess. These and other developments may emerge to alter estimates of unmet needs.

Physical facilities costs as projected here include costs of equipment for the building, site development, and auxiliary items such as sidewalks and parking lots, as well as actual building costs.

In the past, the physical facilities costs have accounted for approximately 20 percent of the total annual expenditures for higher education. Current annual expenditures for higher education facilities approximate $1.25 billion.

It is in the national interest to provide adequate physical facilities for the accommodation of every student properly admissible to our colleges, universities, and professional schools in the years ahead. These include all instructional, research, residential, and auxiliary facilities requisite to each institution's performance of its full functions.

The achievement of this objective will require major efforts as follows:

1. An increase in residential and service facilities sufficient to accommodate expanded enrollments of both single and married students who live on campus.

2. An increase in instructional facilities—classrooms, laboratories, libraries, and equipment, quantitatively sufficient for the needs of expanded enrollments and qualitatively sufficient for the ever-changing requirements of an advancing culture.

3. Rehabilitation, renovation, and new construction to wipe out the accumulated backlog of wornout, outmoded, and unsuitable facilities now in use and to maintain facilities in satisfactory condition as they depreciate.

4. Expansion of research and graduate instructional facilities and equipment, in keeping both with the growing needs of the Nation for research and for highly trained manpower and with the mounting potential of undergraduate enrollments from which graduate students and research personnel in increased numbers will be drawn.

THE INCREASING STUDENT LOAD

Facilities needs, like staff needs, are related specifically to enrollments, though in neither case is the relationship direct. Shifts in the proportions of resident and commuting students, of married and single students, and of graduate and undergraduate students will affect facilities needs, as will also modifications in institutional calendars, scheduling, and utilization of space.

The need to accommodate increasing numbers of students accounts for only a part of the upsurge in requirements for physical facilities. The provision of special kinds of space and equipment appropriate to particular instructional functions represents a growing burden on the colleges and universities, many of which will need to replace makeshift arrangements that they have had to use even in some areas of graduate instruction and research. Proper facilities for graduate programs, it should be noted, are generally more costly than those for undergraduate.

New developments in both subject matter and methods of teaching are continuously generating new needs for physical facilities. The increasing emphasis on foreign language study, for example, will require the construction of language laboratories for the application of new learning techniques. Particularly expensive space and equipment are required in the physical sciences, where knowledge of established subjects is expanding rapidly and where whole new fields of study are evolving. The purchase and installation of a nuclear reactor today represents an investment of funds greater than would have been spent for a whole scientific establishment half a century ago.

Much attention is being focused also on new media of instruction and on new techniques in the use of special media, such as television and audiovisual devices. While these developments hold some hope for savings in instructional costs, a point we shall discuss later, we must consider also the requirements that such use could generate for specially constructed facilities.

Medical and dental training facilities are currently being utilized to capacity, but the number of physicians and dentists graduating yearly is not sufficient to maintain current standards of service to our increasing population. To maintain a satisfactory population-physician ratio of 757 to 1, the output of physicians would have to expand greatly.[1] It has been estimated that between 14 and 20 new medical schools will have to be built if the existing population-physician ratio is to be upheld. The financial cost involved here is great since the construction of a medical school requires a capital investment of between $10 and $20 million, depending on whether a teaching hospital is already available or must be included in the investment. The factor of urgency also enters into the consideration inasmuch as there is a lag of 10 years between the planning of a school and the production of its first graduating class.

Contributing further to the need for medical training facilities is the need for dental schools. According to projections of trends in the supply, the number of dentists in practice in 1975 will total only 96,000, which is about 15,000 fewer than will be needed to assure that dentists will be as widely available as now.[2] To forestall such a shortage will require by 1970 facilities capable of graduating 6,180 dentists annually. This is about 2,700 more per year than are now in prospect, and will require a 75-percent increase in training capacity.

The preparation of many professional and semiprofessional technicians also requires specific kinds of facilities, other than those we have already mentioned in connection with the advanced training of scientists, engineers, physicians, and dentists.

Colleges and universities have increased their organized research activities tremendously since the end of World War II. In the academic year 1957-58 approximately 20 percent of their total educational and general expenditures went toward the support of organized research.[3] This is twice the percentage so expended in 1945–46. Although the major portion of these expenditures is underwritten by foundations, industry, and the Federal Government, the main burden of providing physical facilities needed to carry on research normally falls on the institutions themselves. Since organized research activities are expected to continue to increase, colleges and universities will have to devote a significant portion of their funds to equip, construct, and rehabilitate the facilities in which college and university researchers carry on their work.

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[1] The Advancement of Medical Research and Education. U.S. Department of Health, Education, and Welfare. Washington, D.C., June 1958. (Final report of the Secretary's Consultants on Medical Research and Education.) *See* William H. Stewart, ch. 4 of this publication, for discussion of the Nation's health manpower needs.

[2] U.S. Department of Health, Education, and Welfare, Public Health Service, *Physicians for a Growing America*, Report of the Surgeon General's Consultant Group on Medical Education, PHS Pub. No. 709, 1959. p. 67.

Still other factors will influence requirements. More and more institutions are catering to a year-round student enrollment and will have to make additional capital outlays to counteract the resulting more rapid deterioration of buildings and to provide a more satisfactory environment for summer work such as air conditioning, even as they thereby accommodate more students. There is also a need for housing for married students and associated auxiliary facilities, such as nursery schools, university laboratory schools, health centers, and dining areas.

SPECIAL FACTORS RELATING TO RESIDENTIAL REQUIREMENTS

The growing numbers of married students on college campuses in recent years has caused institutions to make increased investments in residential facilities for such students. A study by the Association of College and University Housing Officers shows that nearly two out of five institutions responding to their questionnaire have assumed responsibility for married students' housing by constructing at least some of the necessary facilities.[4]

There is ample evidence that colleges and universities consider the accommodation of married students a permanent responsibility. The Office of Education's physical facilities survey reveals that 4.6 percent of college and university expenditures for construction of housing during 1951–55 was for married students.[5] Institutions estimate that during 1956–70, 9.7 percent of their expenditure for housing will be for married students. Since about 2½ times as much residence space is required for a married student as for a single student, and since increasing numbers of married students are attending colleges and universities, proportionate increases in housing expenditures are unavoidable. A factor that further complicates the task of financing residential facilities is the increase in the proportion of women students in colleges and universities, since dormitories for women are more expensive to construct than those for men.

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[3] *Financial Statistics of Institutions of Higher Education, 1957–58.* U.S. Department of Health, Education, and Welfare, Office of Education, September 1960. *See also* Herbert H. Rosenberg, ch. 18 of this publication, for further discussion of research in institutions of higher education.

[4] *Survey: Married Students' Housing.* Report of Research Committee, Association of College and University Housing Officers, July 1957.

[5] W. Robert Bokelman *and* John B. Rork. *College and University Facilities Survey, Part 1: Cost and Financing of College and University Buildings, 1951–55.* U.S. Department of Health, Education, and Welfare, Office of Education, 1959.

Urban universities especially are faced with the responsibility of providing additional housing for their expanding student bodies, as they increasingly attract undergraduate and graduate students from outside their immediate areas.

Additional residential facilities will be needed by junior colleges, many of which have experienced increased enrollments. In 1961 about 240 of 276 private junior colleges in the Nation provide some residential facilities for their students, as did also a few of the 391 public junior colleges.[6] States where junior colleges abound, such as California and Texas, estimate that an increasing number of their public junior colleges will need to operate student dormitories. A number of States either are planning or will soon have to plan dormitories for their public junior colleges.

One decided economic advantage of the community junior college, its proximity to the students' homes, has tended to limit the need for dormitories and other physical facilities. Whether the number of junior colleges will continue to increase as rapidly as it has been increasing since World War II is not known. However, increase in the number of these institutions will continue to receive prime consideration by States as one method of alleviating the crowded conditions in existing colleges and universities. Students who complete the training available at the community junior college will either terminate their formal education at that point or transfer to a 4-year college or university. Transfer students will then strain the instructional and residential facilities of 4-year colleges.

Although junior colleges offer some opportunity for saving in total plant investment in dormitories, a rapid rate of increase in the number of junior colleges will nonetheless require substantial additional investments in instructional and general facilities.

REVIEW OF RELATED STUDIES

Several research studies conducted at national and State levels furnish important clues to the magnitude of the investment that must be made in the Nation's higher education facilities in the years immediately ahead.

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[6] Advance data from College and University Enrollment and Facilities Survey, 1961-65. U.S. Department of Health, Education, and Welfare, Office of Education.

A study made by Long and Black[7] projects 1957–58 enrollments to 1970 and, on the basis of this projection, estimates the additional physical plant facilities that will be required to accommodate the anticipated enrollments. The estimated increases over the 3,027,029 figure for 1957–58 enrollment range from a low of 2,017,000 to a high of 2,851,000 in 1970.

In addition to estimating the needs for expansion of facilities for the period 1957–70, Long and Black consider the cost of replacement of existing substandard facilities. Using a replacement rate of 2 percent per year, they estimate replacement of facilities other than residential to cost $240 million per year, and replacement of residential facilities $80 million per year. Adding the cost of replacement between 1957 and 1970 ($4.32 billion for facilities other than residential and $1.38 billion for residential) to the cost of facilities expansion, they estimate the total amount of funds needed for physical facilities at $12.19 billion to $15.26 billion, exclusive of the cost of additional land, equipment, and campus improvement.

A study published by the Council for Financial Aid to Education in 1959[8] surveyed the plant needs of 885 leading colleges and universities during the 1957–67 decade. The estimated cost of buildings, equipment, and improvements for the 820 institutions that responded was $6.04 billion. With this figure as a base, it is estimated that the total cost of construction, equipment, and improvements for all institutions of higher education during the 10 years would be $11.5 billion, or approximately $3,834 per student increase in enrollment, exclusive of the costs of acquisition and improvement of sites and of replacement for deteriorated buildings.

In the second of its five reports of studies[9] dealing with physical facilities of institutions of higher education, the Office of Education included a chapter on projections of buildings needed through 1970. On the basis of assumptions concerning enrollments, additional instructional and residential needs, construction costs, and rehabilitation or replacement of buildings in 1970, this report estimates that for 1956–70 the cost of new construction needed to accommodate 2,823,000 additional students by 1970 will be $12.36 billion, or over $824 million per year for the 15-year period. Of the $12.36 billion needed for new construction, it is estimated that approximately $7.06 billion will be needed for instructional, research, general, and auxiliary facilities, and $5.30[illegible]lion for residential facilities.

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[7] John D. Long and J. B. Black. *Needed Expansion of Facilities for Higher Education, 1958–1970. How Much Will It Cost?* American Council on Education, Washington, D.C., 1958. See ch. 1 of this publication for projections by Louis H. Conger.

[8] Council for Financial Aid to Education. *Nearing the Breakthrough.* New York. The Council. June 1959.

[9] Robert W. Bokelman *and* John B. Rork. *College and University Facilities Survey. Part 2: Planning for College and University Physical Plant Expansion, 1956–70.* U.S. Department of Health, Education, and Welfare, Office of Education 1960.

Another Office of Education statistical study [10] indicates that 15 percent of the college facilities first occupied between 1940 and 1957 are unsatisfactory and should be razed. This high rate of obsolescence is due largely to the acquisition by colleges of temporary buildings under the Government's surplus disposal program immediately after World War II. Make-do measures during the money shortage of the depression and the materials shortages of the war period have produced a backlog of deferred replacements that cannot be indefinitely prolonged. The same study indicates that 12 percent of the buildings occupied before 1901 and still in use in 1957 should be razed; that 17 percent of those first occupied between 1901 and 1920 should be replaced; and that 5 percent of those first occupied between 1921 and 1940 are obsolescent.

If an adequate allowance were made for the cost of keeping facilities in satisfactory condition as they depreciate from time and normal usage, as well as an adequate allowance for replacing and rehabilitating facilities then obsolete and substandard, a computation based upon probable needs during the period 1958–70 places the estimated cost of such measures at $4.8 billion, or about $400 million per year. In ~~this~~ study it was assumed that colleges and universities were constructing both instructional and residential facilities to accommodate the additional students during the 1956–58 period, but that funds to care for replacement, rehabilitation, and normal depreciation would continue to be deferred and that these factors would need to be cared for during the remaining 12-year period 1958–70. Therefore, the needed construction for accommodating additional students, estimated to cost $12.36 billion, was averaged over 15 years at $824 million per year. The cost of replacement, rehabilitation, and allowance for depreciation, estimated at $4.78 billion, was averaged over 12 years at $399 million per year. For the 12 years 1958–70, the average for buildings alone was determined to be in excess of $1.22 billion annually.

The report of the American Council on Education included summary data from research studies made by 15 States.[11] Data from six States (Florida, Indiana, Louisiana, Mississippi, New Mexico, and Tennessee) that had comparable data in each of the categories were compiled to obtain an estimate of what the cost peradditional student would be to meet the needs by 1970 for residential facilities and those other than residential. For these six States it was found that per-student need in other than residential facilities would average $1,938, and that the residential facilities cost per full-time student housed would average $1,635. It was estimated that one out of every three additional students would require housing.

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[10] Louis A. D'Amico and E. Eugene Higgins. *College and University Facilities Survey, Part 3: Inventory of College and University Physical Facilities, December 31, 1957 (a Preliminary Report).* U.S. Department of Health, Education, and Welfare, Office of Education, 1959.

[11] Long and Black, op. cit.

Although the estimates reached in the studies mentioned naturally differ, they constitute conclusive evidence that the per-student investment in additional facilities required between now and 1970 is great indeed.

BASIC ASSUMPTIONS OF THIS REPORT

To determine the cost of needed facilities for any target date in the future is a complex problem in statistical forecasting. Continued use of substandard and obsolete buildings has frequently delayed the construction of new buildings. A further complication is the fact that we must project into the indefinite future a rational balance among the types of facilities to be provided: classrooms and laboratories, residence halls, administrative office space, auditoriums, libraries, gymnasiums, hospitals, student unions, and other auxiliary facilities. The proportions in which investment must be divided among these, as well as the total amount required, are dependent upon a wide variety of factors.

Data are reliably established on two important factors to be considered in estimating future building requirements: the college-age population and the condition of buildings now in use. The trend in the proportion of college-age population actually going to college, though it cannot be forecast with certainty, is reasonably well established. Other factors in making cost estimates of physical facilities, such as space per student and cost per construction unit, can be established from data available on State, regional, or national levels. It is difficult, however, to assess to what extent better utilization of existing campuses will affect the total estimated cost, or the proportion of the college population of the future that will have to be housed. In projecting facilities costs these and many other factors can be used only through arbitrary assumptions based on the record of the past and on one's best judgment as to the future.

The following assumptions have been made in projecting to 1975 the total cost of necessary expansion and improvement of the facilities of the Nation's institutions of higher education.

Basic assumptions pertinent to all three enrollment projections:

1. That on January 1, 1961, the gross area of instructional buildings was 408.3 million square feet, and the gross area of residential buildings was 229.9 million square feet.

2. That because of obsolescence and substandard conditions, 12.3 percent of the instructional buildings—50.2 million square feet—and 10.5 percent of residential buildings—24.1 million square feet—need to be replaced.
3. That, in addition to the obsolete and substandard buildings mentioned above, 9.8 percent of instructional and related buildings (408,275,680 × 0.098) and 9.1 percent of residential buildings (229,925,000 × 0.091) are presently in rundown condition and functionally obsolete. These need to be returned to satisfactory condition as soon as possible. The number of additional square feet required for instructional and related buildings will amount to 40,011,017; for residential, 20,923,175.
4. That each additional full-time student will require an average of 160 square feet of space for instructional and related purposes. (This figure is based on 127 square feet per student as developed by the Office of Education's *College and University Facilities Survey, Part 2,*[13] and adjusted to apply to full-time students only.)
5. That any present excess capacity in residential facilities in some colleges and universities throughout the country is more than balanced by the serious overcrowding in many others—an inference based on data from page 4 of the *College and University Facilities Survey, Part 2.*
6. That institutions will continue to provide housing for one-third of the full-time students. This fraction was derived by analysis and extrapolation of residential-enrollment data also in part 2, page 4, of the *College and University Facilities Survey.*
7. That 90 percent of the full-time students will be single.
8. That 10 percent of the additional students furnished institution-owned housing will be married.
9. That each additional single student housed in institution-owned dormitories will require 237 gross square feet of space; each student family, 572 gross square feet.
10. That construction costs of buildings will increase at the rate of 1.8 percent per year. Thus a building costing an average of $20 per square foot in 1960 will cost $21.86 by 1965, $23.90 by 1970, and $26.14 by 1975.
11. That other capital costs, including costs of land, equipment and furniture, and campus improvements, will amount to 50 percent of building construction costs.
12. That the cost per square foot for replacement of obsolescent and substandard buildings, instructional and residential, will rise at the same rate as that of constructing a new facility.
13. That the cost of returning buildings to satisfactory condition will average 50 percent of the construction cost of new buildings.
14. That identifiable needs for specialized research—related facilities in medicine, dentistry, agriculture, engineering, and other professional fields over and above the growth assumed for increased enrollments—will require capital outlays in excess of $4.5 billion.
15. That obsolete and substandard instructional and residential buildings, as well as facilities presently in rundown condition and functionally obsolete, will be remodeled, modernized, or replaced by 1970.

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[13] Bokelman *and* Rork, op. cit., p. 23.

16. That in addition to the obsolete, substandard, rundown, and functionally obsolete space expected to be remodeled, modernized, or replaced by 1970, 1 percent of the space in use between 1961 and 1970 will require modernization or rehabilitation each year and the rate will increase to 2 percent each year, beginning in 1971.

Assumptions pertinent to enrollment projection I (trend projection): [34]

1. That total *fall* enrollment will increase from 3,610,000 in 1960 to 5,257,000 in 1965, to 7,007,000 in 1970, and to 8,677,000 in 1975.
2. That during this 15-year period, the proportion of *full-time* enrollment will decrease from an average of 65 percent of total fall enrollment in 1960 to 60 percent in 1975.
3. That total *full-time* enrollment will increase from 2,347,000 in 1960 to 3,389,000 in 1965, to 4,354,000 in 1970, and to 5,138,000 in 1975. Compared with 1960 this represents a *full-time* enrollment increase of 1,042,000 by 1965, 2,007,000 by 1970, and 2,791,000 by 1975.

Assumptions pertinent to enrollment projection II (father's attainment projection):

1. That total *fall* enrollment will increase from 3,610,000 in 1960 to 4,697,000 in 1965, to 6,001,000 in 1970, and to 7,140,000 in 1975.
2. That during this 15-year period, total *full-time* enrollment will vary from 62 to 67 percent of total *fall* enrollment.
3. That total *full-time* enrollment will increase from 2,347,000 in 1960 to 3,091,000 in 1965, to 3,843,000 in 1970, and to 4,395,000 in 1975. Compared with 1960, this represents a *full-time* enrollment *increase* of 744,000 by 1965, 1,496,000 by 1970, and 2,012,000 by 1975.

Assumptions pertinent to enrollment projection III (constant-rate projection):

1. That total *fall* enrollment will increase from 3,610,000 in 1960 to 4,367,000 in 1965, to 5,241,000 in 1970, and to 5,982,000 in 1975.
2. That during this 15-year period, total *full-time* enrollment will average from 65 to 68 percent of total fall enrollment.
3. That total full-time enrollment will increase from 2,347,000 in 1960 to 2,937,000 in 1965, to 3,522,000 in 1970, and to 3,966,000 in 1975. Compared with 1960, this represents a *full-time* enrollment *increase* of 590,000 by 1965, 1,175,000 by 1970, 1,619,000 by 1975.

Factors that may alter the projections.—Many unmeasurable influences may turn out to have a marked effect upon the projections resulting from the assumptions stated. Some of these are as follows:

1. Factors that may reduce needs for facilities:
    - More effective space utilization, through changes in scheduling patterns, summer use, and weekend use.
    - Development of more economical building materials.
    - Development of more economical construction techniques.
    - Advances in building design.
    - Interinstitutional sharing of facilities.
    - Increased use of new instructional media such as television and of new instructional methods.

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[34] Projected fall and full-time enrollment data from Louis H. Conger, ch. 1 of this publication.

2. Factors that may increase needs and costs of facilities:
   - Inflation, as reflected in increased costs.
   - Additional functions assumed by institutions of higher education, such as adult education.
   - Emergence of new areas of study and research.
   - Accommodation of increased numbers of foreign students.

In considering the possible effects of any of the foregoing innovations in reducing the need for facilities, account must be taken of the delays in communication, the lag in adopting new approaches that is inevitably associated with human limitations, and the length of time responsible officials will need to give careful consideration to questions of change. They cannot, without abdicating their responsibilities, substitute entirely the experience of others for their own in matters of capital outlay. Therefore, most of the factors that now appear as rays of hope on the horizon are likely to become influential only in the later stages of the projections. Factors that may increase facility needs are likewise intangible and can be applied only to the longer range projection. Accordingly, projections have been made for 5 year intervals—1961–65, 1966–70, and 1971–75.

Based on the assumptions previously stated, table 7 indicates that approximately $23 billion to $33 billion, varying according to the enrollment attained, will need to be expended for higher education physical facilities from 1961 to 1975.

TABLE 7.—Projections of costs of needed facilities, cumulative according to 1961–75 enrollment projections

[In millions]

Year	Projection I	Projection II	Projection III
1961	[illegible]	$1,671	$1,610
1962	4,471	3,681	2,966
1963	6,788	5,426	4,662
1964	9,112	[illegible]	6,079
1965	11,244	[illegible]	7,910
1966	13,556	11,096	9,509
1967	16,106	12,771	11,186
1968	18,155	14,904	12,820
1969	20,771	16,808	14,553
1970	22,870	18,759	16,253
1971	25,247	20,095	17,705
1972	27,012	21,426	19,194
1973	29,542	23,068	20,170
1974	31,306	[illegible]	21,701
1975	33,319	26,613	23,202

The additional amount needed during any one 5-year interval may be expected to vary from a low of approximately $7 million for enrollment projection III in the 1971–75 period to almost $12 million for enrollment projection I in the 1966–70 period. For the entire 15 years the average of the amounts needed annually is $1.5 million for projection III, $1.8 million for projection II, and $2.2 million for projection I. The 5-year figures and annual averages are given in table 8.

TABLE 8.—Projections of costs of needed physical facilities by 5-year intervals, 1961–75, according to enrollment projections

[In millions]

Years	Projection I	Projection II	Projection III
1961–65	$11,244	$8,999	$7,910
1966–70	11,626	9,760	8,343
1971–75	10,449	7,853	6,949
Total 1961–75	33,319	26,613	23,202
Annual average	2,221	1,774	1,547

CHAPTER 12

Who Should Pay for American Higher Education?

Marion B. Folsom[*]

THE FINANCIAL SUPPORT of higher education *is a patchwork quilt.* This support is drawn from virtually every known source of educational assistance—individual gifts and foundation grants, tuition and other payments from students, Federal land-grant moneys, and State tax funds. In addition, many institutions receive funds from private business and industry and a growing amount of income from Federal agencies for research services rendered.

This patchwork quilt of financial support is *no jumble of confusion.* Instead, it is a significantly complete list of the groups that form the broad base of support for higher education in our society. Students, individual alumni, philanthropic foundations, private business and industry, and State and Federal Governments all share the responsibility of supporting our colleges and universities, and this is as it should be.

BROAD SUPPORT ASSURES FREEDOM

If it is true that "*he who pays the piper calls the tune,*" the integrity of higher learning is ensured by the fact that no one group is really paying the piper and thus no one group can "call the tune." This broad base of support ensures that our system will remain free of a single, limiting educational creed. And this, in a sense, is the *genius* of American education—that there is no single interest, no one creed or dogma, that might stifle the freedom and independence we as a people cherish.

Another reason why each of these groups should help support higher learning is that this is the only practical and equitable way. The support of each group is vital if we as a Nation are to meet the educational challenge in the years ahead. Just think of the immense job that must be done! Enrollments in institutions of higher education are expected by 1970 to be nearly 2½ times the enrollments of 1957–58, by 1975 to be about three times as large. Costs will rise even more. Even as we prepare to provide facilities and teaching staffs to meet the rise in enrollments, we must take action to enhance the quality of our national performance in higher education and to correct the relatively low salaries of college and university faculties and other teaching staffs.

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[*] Former U.S. Secretary of Health, Education, and Welfare.

In 1957-58, some $2.4 billion was spent throughout the Nation for teaching students in public and private institutions of higher education (including administrative and operating expenses allocable to teaching functions, but excluding research, nonteaching activities, and living accommodations). Of this total, $1.8 billion was paid for professional staffing, apart from research staffing and for other personnel costs.

Higher education teaching costs (as defined above) of $7-$9 billion are likely for 1970; by 1975 these costs may reach $8.5-$12.5 billion, if we consider only the increase in enrollment and in costs per student necessary to gain and retain a more competitive salary level for those on faculty and other instructional staffs of colleges and universities. However, marked changes are taking place in the responsibilities of the colleges and universities, and the quality of these institutions will have to be raised commensurately.

Ten and fifteen years from now the people of this Nation will have a greatly increased income out of which to pay for higher education. If a high level of employment is achieved, the gross national product of this Nation can be expected to be about double the 1957 level by 1970 and exceed $1 trillion by 1975. However, expenditures for teaching will grow much faster and require an increasing share of our national output. Even if average tuition payments rise proportionally to the increase in family income, and if all other sources of support are enlarged in amounts consistent with the growth in national output, additional funds of over $2 billion in 1970 and $3 billion in 1975 will have to be raised to finance current expenditure for teaching in these years.

With this kind of financing to be done, it would be entirely unrealistic to rely upon any limited base of support. No one group can begin to shoulder the entire load.

It has been proposed that students should pay the full cost of their college education. This is a dangerously beguiling idea, and the annual report of virtually every eastern university president played upon this theme last year. There have been countless techniques proposed to make this idea palatable—including some that come close to indenturing the student for life.

TUITION CAN'T COVER FULL COST

The idea is not a new one. President Francis Wayland of Brown University, over a century ago, tried an experiment to see if education could, as he put it, "be disposed of at cost." For what it may be worth—Wayland's conclusion was definitely in the negative: college education could *not* be disposed of at cost, even though he tried altering the product to give it greater sales appeal. He suggested that students pay by the lecture, and that professors live off the admissions they were able to attract.

This may seem a ludicrous illustration, but it drives home this point: that if education is dispensed as a commodity, all the laws of the market must apply, and we shall wind up offering, not the kind of education we believe to be valid, but the kind that will sell.

At the root of the student-pay-all proposal is the notion that the student benefits financially from his education—which is undoubtedly true. The variety of tuition rates for different schools within a university structure are not always attributable to differences in costs of instruction.

What is the real reason for relatively low tuition rates in seminaries preparing students to be clergymen, for example? Certainly we don't expect all clergymen to wind up penniless in small parishes. Rather we subsidize their education so that more young people can afford seminary tuition. Thus, we encourage young people to enter the clergy because *we benefit from having clergymen in our midst*. But it is important to realize that we as a Nation benefit from the existence of *all* groups of college graduates.

As an obvious example, we benefit from the work of physicians and are in great need of them. Yet the number of physicians has scarcely kept pace with our population, and it appears that there will have to be a step up in the number of physicians trained each year if the number of physicians per 100,000 population is not to decline in the future. Thus the Nation will need from 15 to 20 more (*new*) medical schools in the next decade to produce needed medical personnel. Shall we say that the students will pay the increased cost of creating 20 full-scale medical schools? If we do, we shall long be wanting for doctors.

Or take the case of teachers. Is it only the young men and women who study to be teachers who benefit from that study? Or does society have an interest in *inducing* more young people to become teachers?

It seems to me obvious that all of society benefits from having young people "get educated," regardless of profession. A sample argument is this: In 19 cities where half the population had finished 11 to 12 years of school, per capita retail sales averaged $1,100; in 11 other cities where the median was only 8 to 9 years, average retail sales per year were only $917. That argument should impress at least the business community.

But a better argument, and one that should impress us all, is Thomas Jefferson's statement that "If a nation expects to be ignorant and free in a state of civilization, it expects what never was and never will be."

ALL BENEFIT—ALL SHOULD CONTRIBUTE

We as a Nation have far too much at stake to take the sanguine view that we shall have only as much education as our young people are willing to pay for. *Through reasonable tuition rates we must induce young people to get an education, because their education will be of benefit—directly or indirectly—to those who paid the difference between that tuition and the real cost of education.*

Now, if we are agreed that "society" must pay this difference, to what source in society should we turn? Well, as a starting point, how about individual alumni and friends? Certainly it is only right that we look to them for widespread support. But in spite of such generous support as the Mellons' $15 million gift to Yale University, no one seriously believes such gifts can meet more than a small fraction of the total costs of education.

As for foundations, even the massive benefaction of the Ford Foundation—undoubtedly the boldest stroke in the history of philanthropy—barely made a dent on faculty salaries, however great its symbolic value.

And business and industrial corporations? They can and should do much more than they are now doing. But even if we appraise this new source optimistically, business and industry can never provide a major degree of support.

All of these sources of support can, together, pay a significant portion of the cost of education, but they cannot provide the entire answer on a nationwide basis. We must look to a further, and potentially the most extensive, source—namely, the public.

Now I would remind you of a fact that is often overlooked—that the public has indirectly supported higher education in a very substantial way throughout its history by excusing higher education institutions from virtually all tax responsibilities. If property taxes were applied to the real estate of American colleges and universities, the cost would be immense. The privilege of tax exemption, then, is a principal form of support for higher education, and we should not overlook it.

GOVERNMENT SUPPORT NEEDED

The Government has traditionally given direct support to higher education through many programs. And I believe that the Government *should* support higher education—to an even greater degree than it does now. As I pointed out before, the Nation as a whole benefits from an educated population and therefore should help encourage and pay for this education. Also, from a practical point of view, I don't see how we can pay for the higher education that we *as a Nation* need, without digging into our collective tax pocket.

I say this, fully aware of the potential dangers of Federal aid. Yet I refuse to concede that Federal aid means Federal control, and there is ample evidence that this is a greatly exaggerated danger.

We must follow the thinking of the wise investor, who does not believe that his blue-chip common stock will fail him but who nonetheless hedges his investment—diversifies his portfolio—*just in case.* As a sensible people, we do not want to "put all our eggs into one basket." And I think it would be plainly unwise for American higher education to look to the Federal Government for more than a modest fraction of its support. Massive doses of Federal medicine could damage a basically healthy system of higher education.

I tried, therefore, during my term in Washington to analyze carefully only the real ills of our system and then prescribe only those steps that would stimulate normal and healthy recovery. We had the advantage of the recommendations made by the 1955 White House Conference on Education. We also had the recommendations of the very able committee appointed by the President to study education beyond the high school. We conferred with over a hundred educators from all phases of our educational system. The President presented to Congress proposals which resulted from these various deliberations. Congressional committees held lengthy hearings, with many educators and others testifying. The result was the National Defense Education Act, passed during the closing days of Congress in 1958.

APPROPRIATE FEDERAL AID

The defense education program is the first real program of general Federal aid to education, and I think it is a good example of the appropriate role of the Federal Government. It provides leadership and encouragement without creating dependency upon the Federal Government as a source of financial support.

The Act states: "The security of the Nation requires the fullest development of the mental resources and technical skills of its young men and women." The programs established under the act have been designed to identify and educate more of the talented young people and to improve the means of teaching.

It has three major objectives: first, to reduce the current loss of able manpower from our schools and colleges; secondly, to give increased emphasis to the basic studies of mathematics, science, and modern foreign languages; and, thirdly, to help increase the supply of college teachers.

In regard to the first, it is estimated that of the upper 30 percent in high-school graduating classes, only half of the boys and one-third of the girls become college graduates. This loss may be partly remedied by early testing of aptitude and by improved guidance for promising students to see that they make the most of their high-school education. Funds for this program provided on a matching basis by the State and Federal Governments should be authorized and the program extended to include elementary schools and 2- and 4-year college institutions.

As provided by the act, long term student loans administered by the institutions, with 90 percent of the funds being advanced by the Federal Government, permit needy students to stay in college once they get there. The student loan program should be continued and put on a revolving basis, and the present ceiling on Federal contributions should be raised. The present feature which forgives indebtedness up to 50 percent of the loans to those who become public school teachers should be extended to include all school and college teachers.

When the National Defense Education Act was originally being discussed in Congress, it was proposed that the act provide for a limited program of Federal scholarships for able high-school graduates, the number to be allocated to the States on the basis of number of graduates. Under the proposal, the scholarships would be awarded to individuals by the States on the basis of merit and need, the amounts ranging from $100 to $1,000. This provision was stricken from the House bill on the ground that the loan provisions would make a scholarship program unnecessary. I still feel that there would be distinct merit in such a scholarship program, not only to assist able and needy youth to continue their education beyond high school, but to serve as an incentive for higher academic achievement throughout the entire high-school population.

In addition to providing student loans, the act bolsters instruction in mathematics, science, and languages in several ways. It encourages better State leadership by helping to establish State supervisors in science. These State supervisors have helped schools to pep up their science programs. As a result of the enactment of the Vocational Education Act of 1918, virtually every State in the Nation today has supervisors of home economics, agriculture, mechanical trades, and retailing. But at the time the National Defense Education Act was enacted, only eight States had supervisors in science. Obviously some encouragement was needed. The act also provides for more complete laboratory equipment through matching State and Federal funds for that purpose. It has served to enlarge programs for upgrading teachers of mathematics, science, and languages, and to encourage research into more effective methods of teaching these subjects.

The third major objective of the act is designed to increase our supply of critically needed college teachers by providing fellowship grants to graduate students and grants to the graduate schools. The act provides that these fellowships should be given only to institutions which are expanding their present program or inaugurating new programs. Additional fellowships should be authorized for institutions that can use them within the existing capacity of established departments. There are now many vacancies in these graduate departments. With the great need for more young people to obtain graduate degrees, these fellowship grants would be extremely helpful. The program should be broadened to include students who plan to teach in public elementary and secondary schools as well as in higher education.

NEW ACT PROVIDES LEADERSHIP

The National Defense Education Act is injecting a stimulus of about a billion dollars into our schools and colleges over a 4-year period—a healthy shot in the arm, to be sure. Congress in 1961 extended the act for 2 years beyond June 30, 1962. Yet it will increase the amount we currently spend on education by less than 2 percent. It is not going to kill local responsibility or support for our schools—far from it. Its matching provisions and other built-in stimuli are certain to result in increased local and State support for education. This is what one can truly call constructive Federal leadership—leadership without domination—stimulation but not suffocation. Educators have generally agreed that the results of the program have been satisfactory. Some recommend that the program be expanded to include assistance in the teaching of English as well as mathematics, science, and foreign languages, and also that the fellowship program for graduate studies be expanded.

The Government has an important responsibility to join private sources in support of higher education. The patchwork quilt of support is one of the fundamental strengths of our educational system. Major private sources of support serve as an anchor to windward against any drift toward Government control, and Government support will prevent education from becoming the privilege of the well-to-do. It is almost literally true that a young person of ability in the United States has spread before him every conceivable avenue of educational opportunity—the richest intellectual fare available in the history of mankind.

As in the past, the vitality of American higher education in the future will depend upon an ever-broadening base of support. That students, alumni, philanthropic groups, business, and industry must maintain and enlarge support through traditional avenues is self-evident. But higher education also must be supported in part by the American people, acting through their system of representative government. This should not be viewed with alarm, but as evidence of still broader strength for American higher education.

CHAPTER 13

The Federal Government Role in Higher Education

Roy E. Moor[*]

THIS paper examines the part which the Federal Government may play in the story of higher education in the United States during the next decade. Basically, two questions are asked in the following pages: (1) On economic grounds, should the Federal Government assist higher education more fully? (2) If more assistance is given, what types of economic decisions will be necessary about the form of aid?

The attempt to answer these questions in an analytical manner represents an interesting—and constructive—intellectual exercise. It seems desirable for any society to examine the basic economic interrelationships between its government and its educational organizations.

However, no study can be made of higher education in the United States in the 1960's without recognizing one fact: this Nation is in a struggle for survival, and education is a principal source of strength for that struggle. Mobilization of intellectual resources in this decade can be more crucial to the Nation's future than was mobilization of physical resources in World War II. Without the mobilization of intellectual resources, President Kennedy has stated, ". . . the Federal Government will not be carrying out its responsibilities for expanding the base of our . . . military strength."[1] Under present conditions, these military circumstances seem almost infinitely more significant than any other considerations. However, the purpose of this chapter is to examine the economics of higher education. Let us turn, therefore, to the more strictly economic aspects of the Federal Government's role in higher education.

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[*] Fiscal policy staff economist for the Joint Economic Committee, U.S. Congress. This chapter was prepared while the author was a Brookings research professor at Brookings Institution, on leave from Williams College. The views expressed are those of the author and do not necessarily reflect the position of any of these organizations.

[1] U.S., Message from the President of the United States relative to American education, 87th Cong., 1st sess., Doc. No. 92, Feb. 20, 1961. p. 1.

I. Economic Aspects

It is useful, initially, to recognize the extent to which the Federal Government has already participated in the provision of higher education. Contrary to popular belief, the Federal Government has traditionally supported higher education to some degree in the United States and has done so increasingly in recent years as financial requirements have increased. No attempt will be made here to describe all the various Federal programs,[2] but it is important to note their scope. Federal aid to higher education dates back at least as far as 1787, when Congress granted lands for educational purposes in Ohio. This policy continued with almost every new State that joined the Union. The first and second Morrill Acts in 1862 and 1890 expanded the policy of financial assistance for land-grant colleges, and this assistance continues today. During the 1930's many of the present buildings on campuses of State universities and land-grant colleges were constructed with substantial assistance from the Works Projects Administration and other Federal recovery agencies. The Housing Act of 1950 authorized long-term loans at relatively low interest rates for construction of faculty and student housing, and a substantial number of colleges have taken advantage of these loans.

Federal aid to education has included not only assistance to States and institutions but also subsidies to students. Student grants were initiated in 1933 by the Federal Emergency Relief Administration and were continued under the National Youth Administration until 1943. After World War II the well known GI bill of rights—the Servicemen's Readjustment Act of 1944—was enacted, and subsequent legislation extended similar aid to veterans of the Korean war. Some former servicemen are still eligible for these benefits, and many war orphans now reaching college age will also be helped.

EXTENT OF PRESENT FEDERAL SUPPORT

At the present time the Federal Government carries on at least four categories of programs in the field of higher education.

The major category in terms of dollar amounts is, of course, research. In addition to the well-known research outlays of such agencies as the Departments of Defense, of Agriculture, and of Health,

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[2] One volume on Federal Government programs for the support of higher education, Alice M. Rivlin, *The Role of the Federal Government in Financing Higher Education*, was published in 1961 by the Brookings Institution; another, by Homer D. Babbidge, Jr., and Robert Rosenzweig, entitled *The Federal Interest in Higher Education*, will be published in 1962 by McGraw-Hill Book Co., Inc. For a brief résumé of the entire history, see *Federal Aid for Education*, by Helen A. Miller, prepared for the Committee on Education and Labor, House of Representatives, 87th Cong., 1st sess., committee print, May 1961.

Education, and Welfare, the Atomic Energy Commission, the National Aeronautics and Space Administration, and the National Science Foundation, research funds are also granted by such agencies as the Departments of the Interior, of Justice, and of the Treasury, and by the U.S. Information Agency. In 1957-58 institutions of higher education in at least 31 States received more than $1 million from the Federal Government for research. In a number of instances the Government actually owns research facilities and arranges with universities to operate them. Grants may be made either to the institutions or to faculty, and the funds directly or indirectly affect many aspects of teaching; for example, research projects of graduate students.

Another category of Federal financial influence is in the general area of education and training programs. For example, the National Science Foundation conducts scientific educational institutes, which are designed to improve and update teaching, including college teaching. The National Defense Education Act provides for instruction in modern foreign languages. The International Cooperation Administration carries on educational programs in foreign countries, which are arranged through contracts with universities. The ICA also conducts educational missions and some engineering work through the medium of colleges. Other programs in this general area are carried on by the Reserve Officers' Training Corps; the Federal Extension Service, Department of Agriculture; and the Public Health Service, Department of Health, Education, and Welfare.

A third category of Federal participation in higher education is aid to students. The best example of this is the National Defense Education Act program of making loans to students. A number of fellowships are given by the Atomic Energy Commission, the Public Health Service, and the National Science Foundation. Some traineeships and professorial training programs exist, for example, those conducted by the National Institutes of Health; and some direct stipends are given for advanced ROTC training. Educational benefits also are granted under the Veterans' Administration program. In general, there are very *few* scholarships as such under Federal auspices at present.

In the fourth category—grants and loans for construction of facilities and research-related equipment: the Housing and Home Finance Administration grants funds for dormitories; the Atomic Energy Commission and the National Science Foundation grant materials and equipment; and funds for construction of research facilities are provided by the National Institutes of Health, Department of Health, Education, and Welfare.

Another category, which has seldom been examined in detail, includes the programs carried on under the Government Employees Training Act and related programs, through which various Government agencies give working experience to students during their college years. The Department of Defense also operates overseas military training programs and encourages a substantial amount of college work through correspondence.

Few of these programs are conceived as general assistance to higher education. Rather, they are programs designed to accomplish specific national purposes. Results of research, consulting advice, specialized training, and use of equipment and facilities are all marketable products that are purchased because they yield direct benefits to the Government. The educational institution is in the same position as any other commercial supplier and the price for the service can be determined by market factors.

Institutions of higher learning are engaged in the production and distribution of education to individual students, and the participation of the Federal Government in this relationship between colleges and their students is the subject of primary interest in this chapter. Ideally all Federal financial transactions with colleges should be divided into two classes: those involving a marketable quid pro quo and those that are planned to aid in supporting higher education. However, it is virtually impossible to make this division statistically (as many school administrators have discovered in their relations with the Government, their overseers, and their faculty). The reason is obvious: joint products and joint costs are involved, and any disentanglement must be largely arbitrary.

The Office of Education has recently attempted to list the types of Government programs that are most directly related to higher education, excluding those which are primarily research. This list is shown in table 1, along with the expenditures for each of the programs in the fiscal years 1959 and 1960. Table 2 shows, for the same 2 years, the amount of direct aid to students in fellowship and traineeship programs, the amount paid to institutions of higher education in the form of training grants, and the number of recipients reported. The definitional problems in any such statistical tables are obvious, but these compilations may suggest the order of magnitude of Federal aid for direct higher education. The tables, incidentally, include both undergraduate and graduate student aid. Substantial portions of the totals are for assistance to graduate students.

TABLE 1.—Federal expenditures for higher education, excluding research, fiscal years 1959 and 1960 [1]

[In thousands]

Agency and program [2]	Amount, by year	
	1959	1960
TOTAL	$616,456	$554,273
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE	122,246	166,352
Gallaudet College	834	1,060
Howard University		
Construction	286	881
Operation	1,475	1,476
Staff Expenses	209	209
Curriculum	2,667	2,874
Training grants and fellowships, Institute of Mental Health	19,802	22,640
Traineeships for Public Health personnel and nurses	8,496	8,807
Rehabilitation training grants, OVR	4,757	6,097
Instruction in land-grant colleges and universities	5,052	5,052
Vocational education	1,570	1,665
Education in Public Health Service hospitals	211	248
Training grants and fellowships, Cancer Institute	5,910	6,601
Student loan fund, NDEA	30,473	40,945
Research training grants, NIH	5,705	11,351
Training grants, Heart Institute	7,232	7,790
Training grants, Institute of Allergy and Infectious Diseases	1,758	3,565
Training grants and fellowships, Institute of Arthritis and Metabolic Diseases	2,256	4,385
Training grants, Institute of Dental Research	650	1,073
Training grants and fellowships, Institute of Neurological Diseases and Blindness	5,638	7,284
Research fellowships, NIH	10,003	14,384
Resident and intern training in the clinical sciences at St. Elizabeths Hospital	121	181
Fellowships in programs for the education of the mentally retarded		985
Rehabilitation research fellowships, OVR	42	103
Training at the Robert A. Taft Sanitary Engineering Center	318	476
Experimental training grants to medical schools, NIH	500	500
Chaplain training at St. Elizabeths Hospital	3	6
Training State personnel in maternal and child health programs	1,532	1,586
Training State personnel in child welfare agencies	1,133	1,142
Training State personnel in public assistance agencies	669	860
NDEA fellowships: Institutional grants		2,350
NDEA fellowships		2,320
Counseling and guidance institutes, NDEA	1,754	3,976
Research and studies in language development, NDEA	143	960
Language development institutes, NDEA	957	2,520
DEPARTMENT OF COMMERCE	3,493	4,384
Training foreign meteorologists	41	72
Research and training in the National Bureau of Standards	104	207
Training foreign census technicians	82	89
Merchant marine schools	3,266	4,016
DEPARTMENT OF DEFENSE	48,231	50,040
Professional training for Army Medical Service officers	168	208
Federal Council on Medical Education for National Defense program	405	473
U.S. Air Force Institute of Technology—Nonresident training	3,504	4,776
Medical training for Navy personnel in civilian medical schools	233	237
Education at civilian institutions for Army personnel	710	867
Education at civilian institutions for Navy personnel	4,636	5,008
Professional training for Air Force medical officers	72	85
U.S. Air Force Academy	15,770	15,882
U.S. Military Academy	12,401	12,112
U.S. Naval Academy	10,332	10,392
DEPARTMENT OF STATE	18,720	20,661
Teaching and teacher training grants, Educational Exchange Program	4,152	4,582
University teaching grants, Educational Exchange Program	2,017	2,227
Study grants, Educational Exchange Program	12,551	13,852
DEPARTMENT OF THE TREASURY	4,124	4,245
U.S. Coast Guard Academy	4,068	4,150
U.S. Coast Guard officer specialized training	56	95

See footnotes at end of table.

TABLE 1.—Federal expenditures for higher education, excluding research, fiscal years 1959 and 1960 [1]—Continued

[In thousands]

Agency and program [2]	Amount, by year	
	1959	1960
ATOMIC ENERGY COMMISSION	$6,425	$7,829
Fellowships in biology and medicine	419	630
School equipment and teacher training	1,367	1,919
Special schools and courses	3,728	3,630
Assistance to schools in reactor technology	485	1,100
Fellowships in nuclear science and engineering	426	550
FEDERAL DEPOSIT INSURANCE CORPORATION	14	16
Employee training in bank examining and auditing	14	16
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION	46	122
Flight Research Center training program	1	2
Lewis Research Center training program	18	44
Space Flight Center training program	0	10
Ames Research Center training program	13	33
Langley Research Center training program	14	33
NATIONAL SCIENCE FOUNDATION	49,887	52,132
Science faculty fellowships	2,327	2,261
Special field institutes grants	233	223
Postdoctoral fellowships	1,884	1,785
Research participation grants	2,472	4,134
Special projects in science education	301	311
Academic year institutes for teachers	8,787	9,211
Graduate fellowships	7,385	8,086
Inservice institutes for teachers	1,942	2,248
Secondary school teacher fellowships	1,475	1,300
Summer conferences for teachers	260	276
Summer institutes for teachers	22,348	21,759
Supplementary training for science teachers	473	538
VETERANS' ADMINISTRATION	363,268	248,492
Readjustment training program	347,427	232,598
Vocational rehabilitation program	8,875	6,389
War orphans educational assistance	6,966	9,505

[1] Compiled by Penrose B. Jackson, Federal Education Programs Branch, Office of Education, U.S. Department of Health, Education, and Welfare. Based on reports of Federal agencies to the U.S. Office of Education in its annual survey of Federal activities related to education and other sources. 1959 figures are actual expenditures, 1960 figures are estimated expenditures.

[2] Excludes research grants and contracts and value of surplus property transferred to educational institutions; includes payments to State and local governments, individuals, and to public and private institutions of higher education.

TABLE 2.—Federal fellowship, traineeship, and training grant programs: amount of grants and number of individual recipients, fiscal years 1959 and 1960 [1]

Type of program	Amount (thousands)		Number of recipients	
	1959	1960	1959	1960
Fellowships	36,901	47,070	12,567	14,735
Traineeships	12,752	18,321	5,147	10,787
Training grants [2]	93,885	118,028	66,391	71,128

[1] Compiled by Penrose Jackson, Federal Education Programs Branch, Office of Education, U.S. Department of Health, Education, and Welfare, based on reports of Federal agencies to the U.S. Office of Education in its annual survey of Federal activities related to education. 1959 figures are actual expenditures; 1960 figures are estimated.

[2] Number of recipients includes only those identified as individual trainees under training grants and contracts. Most agencies did not report number of individuals supported under such grants and contracts.

One other statistical point should also be mentioned. The assumption is generally made that any additional Federal contributions to higher education should only consist of the necessary residual amounts after State and private sources of funds have been tapped to the fullest feasible extent. It is, of course, difficult to measure—or even to define—the amounts that should come from State and private sources, and it is equally difficult to judge how much should be added by the Federal Government. However, reasonable assumptions about these quantities, such as those found elsewhere in this publication,[3] suggest that the additional Federal contributions might amount to $2.0 billion by 1970 and $3.0 billion by 1975. The important point to note is that such amounts—while highly significant to higher education—would not bulk large in the total Federal budget. For example, the Bureau of the Budget recently made a series of forecasts of anticipated Government expenditure levels for the next decade.[4] It estimated that expenditures in 1970 would total between $84 billion and $123 billion. Current budget data suggest that the 1970 figures may be closer to the larger estimate. Eckstein has made estimates that are within the same range.[5] Even with the lowest estimated budget totals, an educational expenditure of $2.0 billion in 1970 would be only 2.4 percent of the total. With the higher estimated budget level, the educational outlay would be 1.6 percent of the total. The relative smallness of the potential educational expenditures obviously does not in itself represent a justification for these expenditures. However, a comparison with the estimated budget totals does place the educational expenditures in their context and lends perspective to the following discussion.

JUSTIFICATION FOR FEDERAL SUPPORT

Two general types of justifications for Federal support of higher education will be indicated here: those based on economic factors and those involving equity considerations. The most fundamental economic argument is simply that the intellect of the young is an essential natural resource that must be developed and used to the fullest if the Nation is to maximize satisfactions for the citizenry. In this economic sense higher education becomes a process that produces capital in the form of improved intellectual equipment for future service in the society.

If reliance were placed solely on the free market economy to determine the inputs into this capital process, hindrances could prevent full development of intellectual resources and cause waste of such resources. The most obvious hindrance is inability to meet the costs of production. Exploratory studies indicate clearly that intellectual potential lies in many other lodes of society besides those that can finance their own development.[6] Moreover, it cannot be assumed that the private economy will lend sufficient money to individuals who wish to invest in their own education, since the capital created by education is within the mind—not a separate piece of machinery upon which a lender can foreclose. In addition, private loans would create undesirable discrimination among groups of potential borrowers.[7] Finally, it should be mentioned that the decision maker typically controlling the flow of educational inputs is an 18-year-old who may be least impressed by the long-run returns on educational investment and most sensitive to both the educational hindrances and the alternative lures of the private economy.

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[3] See ch. 11 of this publication.

[4] U.S. Bureau of the Budget, *Special Study: Ten-Year Projection of Federal Budget Expenditures*, January 1961.

[5] Otto Eckstein, *Trends in Public Expenditures in the Next Decade*, Committee for Economic Development, Washington, D.C., April 1959.

The economic justification for Federal assistance to higher education is strengthened by examination of the output side of the educational process. Essentially this process involves the creation, stimulation, and elaboration of ideas. Yet ideas are not merely the commodity of education; they are also the basic ingredient for growth in a society. A continuing stream of new ideas concerning our world seems essential for continuing social and economic growth in the Nation. The more rapidly these ideas are created, the more rapidly we acquire the ability for future growth. But ideas must not only be produced, they must also be distributed. The wider the dissemination of ideas, the more extensive the benefits derived from them. The educational process is the technique designed to create and disseminate ideas.

The Federal Government must concern itself with higher education because the products of education are essential to the Nation's growth and well-being. It has to be recognized that the returns from investment in education accrue not only to the individual but also to the Nation of which he is a part. In effect, the social benefits from education exceed the private benefits—another reason why complete reliance cannot be placed on the free market allocation of resources to education. The benefits to the Nation come in many forms. The social costs from illnesses and inefficiences may be reduced. Basic research can be carried out that may itself yield no marketable product, but nevertheless provides a basis for subsequent development of useful products. In order merely to stay abreast in the international arms and diplomacy races, we must continually be receiving the new injections of ideas that education can provide. The institutions of democracy and free enterprise themselves need the strength that comes from education in order to survive in a world of change.

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[6] *See, for example,* Charles C. Cole, Jr.; *Encouraging Scientific Talent.* New York: College Entrance Examination Board, 1956; Glen Stice, William Mollenhopf, and Warren S. Torgesson, *Background Factors and College Going Plans Among High-Aptitude Public High School Seniors,* Princeton, N.J.: Educational Testing Service, August 1956; Elmo Roper, *Factors Affecting the Admission of High School Seniors to College,* Washington, D.C., American Council on Education, 1950.

[7] Just as Government loans would. For a further development of this subject, *see* William Vickrey, ch. 16 of this publication.

These benefits are national in scope, as is the educational process that provides them. A person may reside in one State, be educated in another, utilize his education in a third, and have the fruits of his training dispersed throughout all the States.

The other basic justification for Federal support of higher education is equity. There are arguments for maintaining income inequalities in the United States, but virtually all of these arguments have one aspect in common: they relate to the economic effects on the individuals who earn. Even if all of these arguments are accepted, it does not follow that income differences should create discrimination among children, who themselves cannot influence their family's income status. Even if society disregards the adult poor on the grounds that their poverty is their own fault, it cannot logically disregard the children of the poor on the same grounds.

In the United States we have gradually raised the level of guaranteed equal educational opportunities to include the high school. The forces that compelled us to raise the level to this height were, in effect, the increasing complexity of the world and the public need for more intellectual preparation of youth before entering it. Yet the world continues to grow more complex and the educational levels that meant intellectual maturity yesterday do not go far enough today. The same forces that raised equalitarian educational opportunities through the high-school grades may now necessitate providing similar opportunities at higher levels.

For the purposes of this chapter, these justifications for Federal aid to higher education will be accepted as sufficient. The next question then concerns the method of Federal aid. In examining this question, the assumption will be made that other current programs of assistance, both State and Federal, are to continue and that any new Federal aid will supplement, rather than replace, the existing programs. This may not be a totally acceptable assumption, since many persons argue for a reappraisal of all Federal aid to higher education and for a new, broader program that encompasses all current and proposed aid and is designed to meet purely educational needs. This approach has great merit, but it is not likely that Congress will consider it.

II. Issues

Several types of decisions need to be made about additional Federal programs. One of these is whether the help should go to States, institutions or students. Another set of issues concerns how the funds should be allocated among the applicants. A third problem area involves the extent of Federal direction over the use of funds. Finally, there are a number of questions about specific techniques, once the more general decisions have been made. The following paragraphs indicate some of the factors to be considered in each group of issues.

ALLOCATIONS TO STATES OR TO INSTITUTIONS

The question of whether Federal funds should be given to States or to institutions hinges on the issue of efficiency and the role of the private colleges. The advantage of granting Federal funds to States, rather than to institutions, is that the States can perform a major portion of the budgetary function. A State can assess the most effective educational uses for the Federal funds among all potential alternatives within the State. Hence, efficiency in the use of Federal funds may be greater than if one Federal agency had to choose among the competing claims of all the institutions in the Nation.

On the other hand, if funds are given to States, there may be a tendency to favor the allocation of funds principally to State institutions and to give less consideration to the requests of private colleges. Moreover, there are constitutional restrictions on the States in reallocating funds to private institutions. In order for private colleges to obtain Federal aid via State agencies, the colleges might also be asked to conform to certain inappropriate State requirements. There have been many instances, of course, in which States have given unqualified aid to private colleges. If, however, the use of State agencies as intermediaries would result in a relative concentration of Federal funds in State colleges, the effect would be to weaken the relative competitive position of private colleges in obtaining resources. For example, more faculty personnel would presumably be drawn toward State schools. Because of the great difficulty in measuring the quality of product turned out by educational institutions, it is impossible to assess accurately the relationships between costs and output or to assess the changes in overall efficiency which would result from a shift of resources from private to State colleges. The products of the two types of schools can probably be differentiated, but both types of products undoubtedly provide economic returns to the Nation. In the absence of objective evidence concerning these returns, it may be unwise to risk discrimination in favor of one educational product to the disadvantage of another.

ASSISTANCE TO INSTITUTIONS OR TO STUDENTS

The choice between assistance to the institution and assistance to the student involves a different situation. If the educational process is viewed as creating a capital good that is of value to the Nation, then the institution becomes the producer of the capital and the student its carrier. On the one hand, financial aid to the institution may be used to reduce the costs that are passed on to the student; on the other, financial aid to the student may be passed back to the school to defray costs. In either case, the aid would seem to be used to meet the same costs and hence the technique used would be a matter of indifference so long as the aid can be restricted to the educational process (including, for example, board and room associated with the education).

One major qualification exists, however. Either the institution or the student may use the grants simply to replace other funds that would have been used in the educational process. A college may have less incentive to campaign for gifts if funds are available from the Government, and a student may use the Government grant instead of his own money, which would then be available for other uses. In effect, therefore, the Government might be subsidizing noneducational expenditures of a prospective donor or of the student. In practice, colleges seem unlikely to depend solely on their financial assets, both because costs of maintaining existing quality are rising steadily and because colleges probably have the usual business and social stimuli to increase output, both extensively and intensively. However, if colleges use Federal aid either to reduce student costs or increase quality with the same student costs, the Government will still be subsidizing noneducational student expenditures in the same way that it would with direct student grants. The only situation under which this result would not occur is if the colleges charged full costs to all students and then provided Government help only to those prospective students who could not otherwise meet the college costs. It seems more likely that the Government can avoid the noneducational use of funds if it supervises the distribution of funds and insures that they go only to students who need them for college costs.

This conclusion raises the next set of issues concerning Federal aid to education; namely, how to allocate the aid. If Federal grants are made to students, there are several logical reasons that support allocations only to those who are unable to pay the full costs of college education. As is indicated above, grants to anyone else means payment of noneducational costs. Furthermore, if the economic justification for Federal grants is accepted, that is, that the Nation receives economic benefits from education, then the corollary should also be accepted that the Federal Government ought to maximize the benefits that the Nation receives from each dollar of Federal subsidy. Yet the net return that the Nation will receive from assisting those who can finance their own education is zero, since whatever national benefits accrue from the education would have been obtained without the subsidies. Because education provides personal as well as extrapersonal benefits, the assumption can be reasonably made that those who have both the intellectual and financial potential for college work will obtain the education for their own best interests. The waste of resources occurs with those who have intellectual ability but not the immediate financial ability to pay for the costs of education.

The principal objection to a means test is moral, not economic. In the case of educational assistance, several factors serve to blunt the usual objections to means tests. First, in colleges there is a long tradition of financial assistance to needy students, and the procedure seems to be generally accepted without social stigma. Secondly, the inadequacy of personal funds is not associated with responsibility for the inadequacy, since the individual, because of his youth, has not had an opportunity to enter fully into the labor force. Thirdly, not all high school graduates who lack financial resources for college would obtain aid from the Government; presumably only those who have the highest apparent potential for college work would receive the aid. Therefore, some distinction is obtained by receiving the financial assistance (especially if a euphemistic title such as "national scholar" is attached to the grant). At the same time, the slothful person is prevented from capitalizing on his weaknesses. The conclusion can be drawn that a means test in education would not represent so invidious a device as it may in other fields.

The administrative feasibility of a means test should also be mentioned. In recent years tests of means, that is, of family financial ability to support a son or daughter in college, have been much more highly developed in the education field than is generally realized. Not only do some colleges ask families to provide Federal income tax information—which is by itself an inadequate indicator because it excludes certain income and ignores assets—but also extensive use is made of means tests such as those of the College Scholarship Service and the National Merit Scholarship Corporation. These tests seem to provide a reasonably accurate measure of true financial ability, and experience with them has been reported highly satisfactory.[9]

If Federal aid is to be given to students, the same logic that supports a means test—in effect, that the returns to the Nation are of paramount importance—also supports allocating the funds to the students who have the greatest potential intellectual ability. The techniques of determining this potential ability involve educational, not economic, issues. However, assuming that the potential can be measured—and hence that rankings can be obtained—there is a further problem of the relative weights assigned to financial need and intellectual ability in selecting the students who receive aid. How is the allocation of funds to be made among those who meet the criteria both of need and of ability? If we adhere strictly to the economic justification for Federal aid, then the problem can be solved by starting with the student of greatest intellectual potential, giving him the minimum number of dollars that will be just sufficient—when added to his own financial resources—to pay for his education, continuing the procedure with the second most able student, and so on until the Federal allocation to education has been exhausted. This solution satisfies the requirement for getting the greatest potential return from the Federal educational investment, in the same way that a businessman selects new capital equipment on the basis of greatest potential returns, while trying to pay the lowest price for each piece of equipment.

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[9] For some reason this experience has not been examined much in the education literature. At least 326 colleges and universities now participate in the College Scholarship Service and the number increases yearly. Modified means tests patterned after the College Scholarship Service computations are employed by a number of other institutions and several States in the distribution of their scholarship awards. See *College Board Review*, College Entrance Examination Board, Princeton, N.J., various issues.

There is a supplementary allocation question: Should Federal grants to students be allotted according to geographical areas? This is also a problem if grants are given to institutions rather than students. In a national economy as highly integrated as ours, there seems to be little sense in arbitrarily assigning Federal educational aid by areas. A student may receive and use his education in different areas from the one where his parents reside, and the national benefits from his education will probably be diffused throughout the entire society. Only if the greatest mobility of educational resources is allowed can students obtain the greatest returns for themselves and the Nation.[9]

It has been argued that high schools in different areas do not produce the same quality of raw material for college. If true, it does not follow that the Nation's best interests are served by having colleges accept inferior raw material, thereby necessarily lowering the standards of college production and final output. The problem concerns improvement at the high-school level. It is possible that the use of ability as the basis of Federal aid to college students may stimulate improvement in high-school training, both because increased college opportunitities would stimulate demand for better college preparation and because local pride would be at stake. At the same time, the intelligence tests to determine the beneficiaries of Federal aid would presumably be designed to measure potential ability to benefit from college work, which may be somewhat different from quality of high-school preparation.

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[9] Seymour Harris, in a letter commenting on the draft copy of this chapter, wrote: "I think there is a good deal to be said for allocating scholarships to some extent on the basis of the number of people of college age in the State, even if this means that some students with high test scores in New York State will be eliminated and some with lower ones will be given scholarships from States like Arkansas or Mississippi."

SPECIFIC vs. BROAD BASE SUPPORT

Another range of issues in Federal aid to higher education concerns the extent of Federal direction over the use of funds. Granting that the funds should be used for higher education, should the Government then go on to specify the types of education? The logic of the economic justification for Federal aid might appear to support specific types of grants, since they can be concentrated in the fields that yield the greatest returns to the Nation. The catch is: Who has the omniscience to decide what types of education will best serve the Nation in the future? We can say that history strongly suggests the future value of education in providing economic growth. We cannot say that history also reveals which types of education will yield the greatest growth in the future. Yesterday, study of the Russian language might have been considered a highly esoteric pursuit; tomorrow, a knowledge of Marathi, Telegu, or Ilokano may be an essential prerequisite for effective American foreign policy. In the absence of knowledge, the best policy may be simply to allow the "invisible hands" to determine the allocation of educational resources. In effect, this places the burden on each individual, with his advisers, to decide what the nature of his own talents is and where they may be most effectively used in the future. The approach also avoids allegations of Federal dictatorship over the educational process.

It may be argued that the conclusion is not so clear cut as this. For example, many girls who receive a college education will marry and withdraw from the work force. However, as informed citizens and intelligent mothers, their contributions to the Nation's well-being and growth could be of primary importance. The same may be true of the students who enter the humanities and the teaching and ministerial professions, although the returns to the Nation may be measured largely in psychic rather than monetary values. Even if we assumed that the only immediate goal of our Nation is defense, it would be extremely difficult to specify all of the types of bulwarks that can be strengthened by education.

OTHER ISSUES

In addition to the three general areas of problems indicated above in connection with Federal aid to higher education, a number of specific issues also exist. Only two of these, which are economic in nature, will be mentioned here. One concerns whether the Federal aid should be in the form of tax reduction or of expenditure subsidy. If the assumption is made that the Federal Government intends to provide a specified number of dollars for the support of higher education—either through loss of revenue or direct outlays—then on both economic and equity grounds the case for direct subsidies would seem to be stronger. The aid can be concentrated on those students who may yield the greatest potential returns to the Nation. The aid can, at the same time, be concentrated on the students who have the greatest need for the assistance. From an administrative standpoint direct expenditures also have the advantage that the Congress can obtain more information about how the Federal money is being spent than it could if the ultimate decisions were in the hands of individual taxpayers and the results had to be inferred from tax returns. Finally, subsidies involve no qualifications in the concepts of income used to measure taxpaying ability, although it should be noted that the income concepts might be sharpened by consideration of personal educational outlays.[10]

Another specific economic decision is required on whether the assistance would be in the form of scholarships or loans. The loans would presumably have to be on more favorable terms than private borrowing in order to accommodate students who could not obtain private loans or who could not afford them. Both scholarships and loans would presumably stimulate additional education. If the same amount of funds were made available each year through either method, the net cost to the Government would be less under a loan program because of repayments of principal and interest. However, the net cost to the student, albeit spread over time, would be greater under loans than under a scholarship program, and this would serve to reduce entry into education to some extent.

Moreover, under a loan program, the process of selecting students for aid would be automatically altered, since only those who had ability, need, and expectation of high incomes after graduation would apply. Prospective students with ability, need, and a desire to enter low-paying professions would be discouraged from getting an education by the financial burden of future loan repayment. At the same time, a loan program would perform an allocative function. Eighteen-year-olds who either have not established their goals for the future or are willing to sacrifice them in order to get an education are encouraged by a loan program to aim only for the highest paying careers rather than the ones they might choose under a general scholarship plan. Under present conditions, a student preparing to enter a lower paying profession must have a personal motivation strong enough to offset some financial sacrifices. A loan program would set the odds even more against him.

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[10] For a further development of this subject, see Richard Goode, ch. 17 of this publication.

It might be argued that the Nation needs most those who will contribute most to the gross national product, as determined by free market monetary returns. Under the loan procedure, discrimination would result against those who do not anticipate high monetary income. This group might include a wide variety of occupational groups who are relatively low paid, or whose contributions fall outside the market system, including ministers, teachers, writers, artists, social workers, nurses, and housewives. It is a social judgment whether discrimination should exist against these. One may entertain the suspicion that on the whole they might contribute as much increment in social value as any other segment of society.

Some have taken the position that though scholarships are appropriate at the undergraduate level, loans can be used for graduate students on the grounds that (1) the time lag before repayment will be less; (2) graduate study generally pays for itself in future professional income; and (3) the work is relatively more oriented to personal benefit and less to public benefit than are undergraduate courses. The first argument does not seem relevant if the problem concerns low future monetary income. The second one does not take into account the differences in future professional income from alternative types of graduate work, which may still create a change in the ordering of preferences after loan factors have been considered. The third argument cannot be documented either pro or con, but it seems highly doubtful if one thinks, for example, of the public benefits from graduate research.

In summary, there seem to be sound economic justifications for making additional Federal investment in the education process, since the process provides essential contributions to the national economy and the national welfare. In addition, such investments can also provide greater equality of opportunity without any reduction in incentives for private efforts. The investment can be arranged—either through institutions or students—to maximize the potential future returns to the Nation. The funds can be allocated to recipients in order to encourage students with both the greatest ability and the greatest need. The returns can be maximized without Federal direction over the specific educational uses to which the funds are put. Direct Government expenditures seem more effective than tax changes, and scholarships will probably be more effective than a loan program. If at least some of these generalizations are accepted, one final conclusion may be drawn: the time to begin considering the particular policies for future Federal aid to higher education is now.

CHAPTER 14

State Financing of Higher Education

Selma J. Mushkin[*]

STATE FINANCING of higher education has its origin in the values and necessities of early America. Thomas Jefferson, father of the University of Virginia, argued that ". . . those persons, whom nature has endowed with genius and virtue, should be rendered by liberal education worthy to receive, and able to guard the sacred deposit of the rights and liberties of their fellow citizens, and that they should be called to that charge without regard to wealth, birth or other accidental condition or circumstance. . . ." The aims of public higher education are by and large the same today—an educated citizenry, social and economic opportunity, and development of productive talents.

The State governments early established State colleges and academies. Before the beginning of the 19th century, State colleges had been founded in Georgia, North Carolina, Tennessee, and Vermont. State governments in this period and later also encouraged the establishment of private colleges and aided them through tax exemption and direct grants. Rudolph, in his inquiry into the nature of 19th-century college financing, writes:

> Both tradition and lack of sufficient historical investigation still stand in the way of a complete understanding of the often crucial role which government played in the financial life of the American college. But where study has been done, it becomes clear how much it meant to many colleges to have large injections of State funds added to their resources.[1]

Bowdoin, Columbia, Dickinson, Hamilton, Harvard, Union, Williams, and Yale are among the colleges enumerated in that inquiry as recipients of early State grants. And there is some evidence that loans from the State governments to the church-related colleges of the Old South made it possible for many of these colleges to survive in the 1840's and 1850's.

"Seminary grants" under the Land Grant Ordinance of 1785 were made to Ohio and Miami Universities, and all new States got land grants for State universities beginning with the admission of Ohio in 1802. Grants authorized by the Morrill Act, now over a century old, encouraged the founding of additional State colleges. Today there exists in each State at least one land grant institution of higher education.

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[*] Economic consultant, U.S. Office of Education.

[1] Frederick Rudolph. Who Paid the Bills? an Inquiry Into the Nature of Nineteenth-Century College Finance. *Harvard Educational Review*, vol. 31, spring 1961.

In the older States, which developed from the original colonies, private colleges—Harvard, Yale, William and Mary, and others—already were established at the time of attaining statehood, and in those States the private institutions still outnumber public ones. In the Far West, by way of contrast, the major share of higher educational opportunities is provided by public institutions, although important and prominent private colleges and universities are located there. Between the Atlantic coast and the Far West the institutional pattern gradually shifts, thus creating the distinct regional pattern characteristic of higher education in this country today. This regional pattern explains many of the underlying differences in State policies with respect to higher education, the variations in public outlays for colleges and universities, and the differences in approaches to the emerging problems of higher education.

Almost all the State governments are now searching out ways and means to meet their threefold responsibilities for higher education: (1) to assure educational opportunities for the growing number of qualified students, (2) to develop manpower capabilities in numbers adequate to supply vital public services, and (3) to build the higher education potential so necessary to economic progress in the State. They are searching for ways to carry the financial load which these threefold responsibilities impose upon them. Well over 40 percent of the current expenditures for student higher education in the Nation's colleges and universities now are paid from State and local taxes. The proportion in public institutions is higher—about 1.5 times as high. About 60 percent of the plant funds of colleges and universities in the United States comes from State or local governments, and for public institutions this proportion rises to almost 80 percent. Although most State and local funds for higher education go to public institutions, some go to private colleges and universities, either directly, or indirectly through student scholarship support or tax exemption.

This chapter deals with some of the major financial questions confronting State governments in meeting the three responsibilities in the period ahead. It draws in part on State-by-State comparisons of outlays for higher education and of tax support, and in part on the work of recent State study commissions in States that have assessed their higher education problems on a comprehensive basis. The range of issues reported is wide. They run the gamut from such broad concerns as financial arrangements to improve the quality of higher education to such detailed ones as techniques of budgeting funds [2] and of compensating local governments for properties removed from their tax base for use by State colleges.[3] The subject of this chapter is limited primarily to the larger financial issues.

A number of study groups have been appointed in the States to explore resources for higher education in relation to emerging requirements and to formulate action programs. In addition to comprehensive surveys in 8 or 10 States, a number of other studies have assessed particular aspects of higher education such as enrollment prospects, 2-year colleges, cooperative arrangements among institutions within a geographic area, and special problems of financing. Martorana and Messersmith, in a 1960 analysis of studies made in the States, identify 23 States whose legislatures have authorized statewide or interinstitutional studies of higher education, and 20 in which studies have been conducted under other auspices. Only in Alaska, Delaware, Georgia, Hawaii, Idaho, New Hampshire, and South Carolina were no studies on higher education reported either as completed or underway.[4] Moreover, in 8 States statewide coordinating boards have been established to promote continuing planning for public higher education, and in 37 States governing boards have been created, which have responsibilities for the control of all public institutions of higher education, or of certain types of institutions, such as teachers colleges.

Recommendations made in the reports on the comprehensive surveys follow a fairly uniform pattern. All the comprehensive studies urge action to: (1) provide greater educational opportunities for the growing numbers of young people, (2) improve the quality of higher education in the State, and (3) develop new educational centers for instruction, research, graduate study, and public service. All urge that the number of college places be increased, and most advocate additional financial assistance to students. To aid in improving the quality of education in the colleges and universities, these study groups advocate increased expenditures for faculty and equipment, introduction of new teaching methods, and expansion of facilities, either by the State or through interstate arrangements, for training students in professional and technical skills. To help foster centers of research and graduate study, new or expanded universities are proposed.

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[2] A. J. Brumbaugh. The Proper Relationships Between State Governments and State-Supported Higher Institutions. *The Educational Record*, 42: 173–178, July 1961; and also Malcolm Moos and Francis E. Rourke, *The Campus and the States*, Baltimore, Md., Johns Hopkins Press, 1959.

[3] Rex H. Cowley and Pauline Martz Mayo. *College and University Tax and "In Lieu" Payments to Municipalities.* Chicago, Ill., American Municipal Association Report No. 166, May 1948.

[4] S. V. Martorana and James C. Messersmith. *Advance Planning To Meet Higher Education Needs, Recent State Studies 1956–59.* U.S. Department of Health, Education, and Welfare, Office of Education, Circular No. 633, 1960.

I. Providing Educational Opportunities

Perhaps the most urgent question before the States is, "How are we to finance educational opportunities for the growing numbers of our young people?"

GROWTH IN ENROLLMENTS IN PUBLIC COLLEGES AND UNIVERSITIES

In the decade of the 1950's, when the U.S. population of college age increased about 1 percent per year, college and university enrollments rose by about 1.6 percent per year. In the last 5 years (1955-60) enrollments increased annually by 2.6 percent.

A large share of the increased enrollments took place in existing institutions, institutions with established traditions and aims. The decade of the 1950's was not a period of rapid increases in the total number of institutions, although there has been a rise in the number of junior colleges and branches of institutions. In contrast, earlier in our history, in the first part of the 19th century, large demands for college going were frequently met by establishment of new colleges.[5]

Between 1950 and 1960 the total number of institutions of higher education listed in the Office of Education's Directory of Higher Education increased from 1,808 to 2,011; these figures include junior colleges but not branches. The number of colleges and universities newly listed in a single year ranged from 20 in 1955 to 89 in 1950. Institutions dropped from the directory during this period also varied in number from 7 in 1959 to 78 in 1954. A review of the institutional listings suggests that of the newly listed private institutions, all but a few were seminaries or small colleges supported by religious groups. Many of these schools were ongoing institutions that requested listing for the first time with a view to possible use of the directory listings as a qualifying condition for public or private aid. Notable exceptions to this pattern were Harvey Mudd College in California and Brandeis University in Massachusetts. Most of the public institutions added to the directory during this period were junior colleges; only 11 degree-granting public institutions were newly listed. Six of these were in California; two in Louisiana; one each in Georgia, New York, and Oregon.

Wide differences exist among the States in the numbers of added college students and in the public institutions' share of these increases, as is indicated in table 1. In some States, such as Florida and California, the public institutions' share of enrollments has been relatively large and the number of added enrollees also has been large, compounding the State's problem in finding ways to meet its requirements.

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[5] *See* Homer D. Babbidge, Jr., Introduction to this publication.

TABLE 1.—Increase in public college and university enrollments as a percent of total increase in opening fall enrollments, and percentage change in enrollments in public and private institutions, 5-year period 1955–60, by State

State	Percentage of total increase in opening fall enrollments in public institutions	Percentage change [1]	
		Public institutions	Private institutions
Alaska	100.0	106.1	
Nevada	100.0	123.7	
Wyoming	100.0	30.0	
Arizona	98.5	78.4	49.8
North Dakota	98.5	50.1	14.6
Louisiana	97.1	46.6	2.7
New Mexico	96.4	61.4	34.4
Colorado	93.5	64.9	11.2
Oklahoma	90.8	28.6	8.9
California	87.4	53.4	32.3
Montana	87.3	42.3	33.0
Washington	86.9	49.0	19.9
Minnesota	86.8	68.4	18.5
Mississippi	85.9	41.8	25.4
New Jersey	85.4	179.1	9.8
Oregon	85.1	62.3	26.6
Michigan	82.6	36.1	25.7
Wisconsin	81.6	42.8	18.0
Kansas	81.4	35.7	33.1
Florida	77.6	74.5	24.0
Indiana	76.5	41.7	17.2
Nebraska	76.3	41.1	30.1
Hawaii	76.1	50.0	(2)
Virginia	74.6	39.2	26.5
Tennessee	71.4	54.8	27.0
New Hampshire	71.4	52.4	19.0
Idaho	71.3	38.5	52.7
UNITED STATES	68.4	42.5	24.9
Illinois	67.8	53.2	19.2
South Dakota	67.8	33.4	43.1
Missouri	65.9	47.6	16.3
Maine	65.8	62.3	40.0
West Virginia	65.7	25.0	41.1
Kentucky	65.6	44.4	38.9
North Carolina	65.3	45.3	26.8
South Carolina	64.6	41.0	24.0
Delaware	59.9	22.1	82.3
Maryland	59.6	37.4	34.5
Rhode Island	58.7	95.0	29.7
Alabama	57.8	15.3	36.3
Utah	56.8	25.5	38.3
Vermont	54.9	29.7	20.1
Georgia	54.5	16.0	29.4
Ohio	54.0	33.2	34.7
Arkansas	52.4	25.0	84.4
Texas	46.7	14.2	39.8
Pennsylvania	39.1	49.2	18.6
Iowa	35.4	19.2	41.2
Connecticut	35.0	31.0	38.2
Massachusetts	32.5	90.1	23.4
New York	31.3	21.0	21.0
District of Columbia	1.5	3.4	32.0

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[1] Alaska, Nevada, and Wyoming have no private institutions. The relatively large percent of change in public institutions in New Jersey reflects the shift of Rutgers from a private institution to a State university during this period.

[2] No degree-credit enrollment in private institutions reported in 1955.

SOURCE: Compiled by Justin Lewis from data on opening fall enrollment (degree credit, resident, and extension), U.S. Department of Health, Education and Welfare, Office of Education, Research and Statistics Division.

The mounting charge on State governments has resulted not only from undergraduate enrollments but also enrollments in professional fields. For example, the expansion of training places for medical students has increasingly become a public responsibility. Of the eighteen 4-year medical schools established since 1930–31, 13 are public and 5 private. In addition, public medical schools have increased their enrollments more than have the private ones. For example, during the period 1930–31 to 1955–56, public medical schools accounted for 987 new freshman places and private medical schools for less than one-third this number, or 299 new places.[6]

As we look ahead to the next 10 years, the population of college age is expected to increase by 1.9 percent a year, or a rate of increase almost twice that of the 1950's. Enrollments are expected to rise at even a faster rate, and again it is anticipated by most observers that a major share of the growth will take place in public institutions, with the concomitant problems of financing falling primarily on State governments. In the decade ahead, just as in the decade recently ended, some of the States will experience increases in college-age population and in enrollments two to three times those in other States. Projections of the population 18 to 24 years of age made by the National Education Association suggest increases between 1960 and 1970 varying from a low of 6.5 percent in West Virginia to perhaps as high as 133.5 in Arizona (table 2).

College going varies widely among the States. As Harris has indicated, there is very little correspondence between (*a*) the proportion of the total State population that is of college age, (*b*) the ratio of the State's college-going population to its total college-age population, and (*c*) the proportion of its college-going population that is enrolled in public colleges.

For example, Harris finds that West Virginia ranks first among the States in the proportion of its population that are of college age, but 46th in the ratio of its total college enrollment to its college-age population; 75 percent of this enrollment is in public institutions of higher education. By comparison, Arizona ranks 12th in the proportion of its population which are of college age, but sixth in the ratio of its total college enrollment to its college-age population; 97 percent of this enrollment is in public colleges and universities. Massachusetts, by contrast, ranks 36th in the proportion of its population which are of college age, but third in the ratio of its total college enrollments to college-age population; only 12 percent of its enrollment is in public institutions of higher education.[7]

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[6] U.S., Staff Report to the Committee on Interstate and Foreign Commerce, *Medical School Inquiry*, Committee on Interstate and Foreign Commerce, House of Representatives, 85th Cong., 1st sess., p. 9 and 11.

[7] Based on revision of data from Seymour E. Harris, "Financing of Higher Education: Broad Issues," in *Financing Higher Education 1960–70*, Dexter M. Keezer, ed. New York: McGraw-Hill Book Co., 1959. p. 63. *See* American Association of Collegiate Registers and Admissions Officer, *Home State and Migration of American College Students, Fall 1958*, March 1959, for data on the immigration and outmigration of students among the various States.

TABLE 2.—Percent change in population 18 to 24 years of age, 1960–70

State	Projection A[1]	Projection B[2]
Arizona	133.3	116.5
Nevada	111.5	131.1
Florida	107.1	96.1
California	98.2	78.0
New Mexico	90.4	87.2
Delaware	82.9	67.5
Hawaii	75.7	56.4
Utah	77.4	75.9
Colorado	70.7	76.9
Idaho	69.3	58.9
Virginia	66.0	58.8
Montana	64.5	61.0
Louisiana	64.2	61.5
Maryland	62.7	60.0
Illinois	60.7	57.7
Connecticut	60.2	58.1
Texas	59.8	62.1
New Hampshire	58.4	54.5
Washington	57.7	50.3
Ohio	57.3	65.3
UNITED STATES	57.4	57.4
Georgia	57.1	56.8
New Jersey	56.1	53.3
Wisconsin	55.6	55.3
Indiana	55.5	61.6
Minnesota	55.2	55.9
South Carolina	54.2	54.8
Oklahoma	53.0	40.7
Alaska	52.5	83.6
Maine	51.3	45.4
Vermont	51.0	39.4
Michigan	50.1	57.7
Kansas	48.9	55.2
Kentucky	48.0	39.6
Massachusetts	47.9	44.1
Oregon	46.6	54.3
North Carolina	46.5	45.3
Alabama	45.9	39.7
Mississippi	45.9	30.9
Missouri	45.7	52.3
Tennessee	41.9	42.2
Rhode Island	40.3	39.0
New York	39.8	45.6
Iowa	39.0	39.8
Nebraska	38.5	37.6
Arkansas	32.4	18.5
Wyoming	32.2	32.2
Pennsylvania	31.6	30.3
North Dakota	28.4	32.0
South Dakota	26.8	30.3
District of Columbia	26.2	33.4
West Virginia	9.7	6.5

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[1] Based on Bureau of the Census population projections II and III and assuming that the amount of net migration during each 5-year period, 1960-65 and 1965-70, will equal the amount which occurred in 1955-60.

[2] Based on Bureau of the Census population projections II and III and assuming that the amount of net migration during each 5-year period, 1960-65 and 1965-70, will equal ½ the amount which occurred in the 1950-60 period population census.

SOURCE: 1960 data from Bureau of Census; projections prepared for the National Education Association in 1961 (unpublished).

REGIONAL DIFFERENCES IN COSTS

Not only does college going vary among the States but also the amount of expenditures per student. A National Planning Association study gives the estimated cost in the academic year 1957–58 of student higher education[7] per full time student or equivalent for the United States and for each of 16 States (table 3).[8]

TABLE 3. Estimated expenditures of public and private colleges and universities for student higher education per estimated full-time student equivalent, total United States and 16 selected States, 1957-58

State	Estimated student higher education expenditures per estimated full-time student equivalent		
	Amount	Percent of U.S. amount	Rank order of 16 States
Total:			
United States [1]	$879	100	
16 selected States	917	104	
California	830	94	10
Connecticut	1,228	140	1
Illinois	1,070	122	4
Indiana	925	105	6
Iowa	799	91	13
Massachusetts	1,119	127	2
Michigan	1,043	118	5
Minnesota	801	91	12
Missouri	796	91	14
New Jersey	908	103	9
New York	1,080	123	3
North Carolina	813	92	11
Ohio	910	104	8
Pennsylvania	913	104	7
Texas	658	73	16
Wisconsin	759	86	15

[1] Includes Alaska and Hawaii, Canal Zone, Guam, and Puerto Rico.

Source: Selma J. Mushkin and Eugene P. McLoone. *Student Higher Education: Expenditures and Sources of Income in 16 Selected States.* Washington, D.C., National Planning Association, March 1960, [processed], p. 18.

The 16 States included in the study account for 70 cents of each dollar spent for student higher education in the United States and for two-thirds of total college and university enrollment. Approximately $880 per student is spent for this purpose in the Nation as a whole. The estimated cost per full time student or equivalent ranges from $658 in Texas—an amount 27 percent below the national average—to $1,228 in Connecticut—40 percent above it. States with relatively high costs per full-time student generally are those with a large number of graduate and professional school students. For example, in New York, where such costs are high, 19.5 percent of the resident degree credit students are graduate and professional school students; and in Connecticut, another such State, 17 percent. Less than 6.5 percent of the students in Missouri and Texas, where costs per student are low, are students in graduate and professional schools. Similar estimates of costs per full-time student or equivalent have not been computed for all the States, and the necessary enrollment projections are not now available to apply such data in arriving at an approximation of expenditure requirements.

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[7] Student higher education expenditures represent the current costs of teaching and the overhead allocable to teaching. Expenditures for student higher education as defined here include expenditures for instruction and departmental research and the portion of expenditures for general administration, libraries, and physical plant maintenance that is used for instruction. It excludes expenditures for extension courses for nondegree students, for other public services, and for organized research and overhead connected with such research, as well as expenditures related to organized activities and to educational departments' sales and services. It also excludes expenditures of auxiliary enterprises and those for student aid.

[8] Selma J. Mushkin and Eugene P. McLoone. *Student Higher Education: Expenditures and Sources of Income in 16 Selected States.* Washington, D.C., National Planning Association, March 1960.

Some indications of the differences in financial loads arising from projected increases in population can be gained from data on teaching expenditures in colleges and universities per person 18 to 24 years of age in the population. These expenditures for student higher education in 1957-58 ranged from $54 in Alaska to $267 in Massachusetts.

Expenditures per person 18 to 24 years of age are highest in the New England States and lowest in the Southeast. Within the New England area there are marked differences resulting from a variety of contributing factors. In Maine, expenditures per person 18 to 24 years of age are 20 percent below the national average; in neighboring Vermont these expenditures are 76 percent above that average. In the Southern States, both those in the Southeast and the Southwest, the average expenditures for student higher education are below the national average. In 12 of the 16 Southern States such expenditures are 25 percent or more below the national average, and in 5 of the 12 at least 40 percent below it (table 4).

TABLE 4.—Estimated expenditures of colleges and universities for student higher education, total and per person in the population 18-24 years of age, 50 States and District of Columbia, 1957-58

State	Student higher education expenditures			
	Amount (in millions) ¹	Percentage distribution	Per person 18-24 years of age	
			Amount per person ²	Percent of average 50 States and District of Columbia
50 STATES AND DISTRICT OF COLUMBIA	$2,294.8	100.0	$147	100
NEW ENGLAND	198.2	8.6	228	155
Maine	10.1	.4	118	80
New Hampshire	12.0	.5	235	160
Vermont	8.9	.4	259	176
Massachusetts	114.4	5.0	267	182
Rhode Island	12.1	.5	152	103
Connecticut	40.7	1.8	212	144
MIDEAST	539.2	22.2	166	113
New York	298.6	11.7	204	139
New Jersey	46.9	2.0	103	70
Pennsylvania	135.8	5.9	152	103
Delaware	4.3	.2	114	78
Maryland	33.8	1.5	125	85
District of Columbia	19.8	.9	238	162

See footnotes at end of table.

TABLE 4.—Estimated expenditures of colleges and universities for student higher education, total and per person in the population 18–24 years of age, 50 States and District of Columbia, 1957–58—Continued

State	Student higher education expenditures			
	Amount (in millions)[1]	Percentage distribution	Per person 18–24 years of age	
			Amount per person[2]	Percent of average 50 States and District of Columbia
GREAT LAKES	$490.7	21.4	$162	110
Michigan	120.5	5.2	187	127
Ohio	114.0	5.0	139	95
Indiana	67.5	2.9	164	112
Illinois	143.6	6.3	173	113
Wisconsin	45.1	2.0	140	95
PLAINS	210.8	9.3	162	110
Minnesota	47.8	2.1	168	114
Iowa	38.9	1.7	170	116
Missouri	52.0	2.3	142	97
North Dakota	8.9	.4	158	108
South Dakota	10.4	.5	181	123
Nebraska	19.8	.9	166	113
Kansas	33.0	1.4	173	118
SOUTHEAST	356.1	15.7	96	66
Virginia	38.0	1.7	92	63
West Virginia	19.7	.9	125	85
Kentucky	24.7	1.1	86	58
Tennessee	35.6	1.6	105	71
North Carolina	49.2	2.1	104	71
South Carolina	19.0	.8	75	51
Georgia	31.2	1.4	79	54
Florida	38.8	1.7	93	63
Alabama	24.7	1.1	81	55
Mississippi	16.6	.7	80	54
Louisiana	42.6	1.9	142	97
Arkansas	16.0	.7	106	72
SOUTHWEST	150.2	6.5	112	76
Oklahoma	28.3	1.2	134	91
Texas	100.0	4.4	110	75
New Mexico	9.4	.4	99	67
Arizona	12.5	.5	103	70
ROCKY MOUNTAIN	67.1	2.8	170	116
Montana	9.8	.4	171	116
Idaho	8.0	.3	138	94
Wyoming	4.8	.2	172	117
Colorado	25.8	1.1	159	108
Utah	18.7	.8	210	143
FAR WEST	312.1	13.6	159	108
Washington	40.7	1.8	165	112
Oregon	25.7	1.1	182	124
Nevada	2.5	.1	99	67
California	237.2	10.3	170	116
Alaska	1.7	.1	54	37
Hawaii	4.3	.2	59	40

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[1] Computed from U.S. Department of Health, Education, and Welfare, Office of Education, unpublished preliminary data compiled from *Statistics of Higher Education, 1957–58*, Biennial Survey of Education in the United States, 1956–58, ch. 4, sec. II, table 2. Does not include U.S. service schools and Canal Zone, Guam, and Puerto Rico. Comparable total for aggregate United States is $2,363,900.

[2] Population 18–24 years of age from 1960 Census of Population, Bureau of Census. (Counts of the college-age populations are made as of April 1960 and include nonresident students attending college in the State and exclude residents attending college in other States.)

While data on opportunities for college education, measured by numbers in the population or by expenditures for student higher education, emphasize variations among States, all States are confronted with the problems of expanding higher education. These problems are made more complicated in some States by the immigration of population, and in others—principally in the poorer and sparsely populated States—by the need to move faster to make up for past deficiencies.

STATE STUDY GROUP PROPOSALS

Each of the State study commissions that made comprehensive surveys seeks through its recommendations to make educational opportunities available to young people who can benefit from advanced education "without regard to wealth, birth or other accidental conditions or circumstances." As is indicated earlier in this paper, the ways proposed to achieve this objective are (1) expansion of the college plant, thereby assuring more college places; and (2) provision of financial aid to students to facilitate their college going.

Increase in college facilities.—Additional college places are sought through a number of different methods. One method is to build new State colleges and universities. Another is to encourage the creation of additional junior colleges, community colleges, and branches of existing State colleges and universities. A third is to enlarge enrollments in existing institutions, public and private, through expansion of college facilities and more effective use of existing facilities.

Capital outlays for facilities of State institutions of higher education are summarized in table 5.

TABLE 5.—Capital outlays[1] of State institutions of higher education, 1950–60

[In millions]

Year	Amount of capital outlays	Year	Amount of capital outlays
1950	[2] $240	1956	380
1951	290	1957	484
1952	266	1958	598
1953	249	1959	[3] 709
1954	243	1960	[3] 675
1955	292		

[1] Includes capital outlays financed from private and public sources.

[2] Estimated from reported data of spending for "education" to exclude that portion not for higher education and make coverage comparable to figures for later years.

[3] Includes Alaska ($2 million in 1959 and $0.7 million 1960) and Hawaii, $3.3 million for 1960.

SOURCE: *Compendium of State Government Finances*, annual reports for 1950–60. U.S. Department of Commerce, Bureau of the Census.

The Michigan survey report, prepared for the State's Legislative Study Committee on Higher Education in 1958 by John Dale Russell, gives priority to community colleges as a way to meet the expanding number of applicants and proposes a series of steps designed to improve the bases and increase the amount of State support of local communities in establishing and operating such facilities.[10] For example, the report recommends that a foundation program of community college support be adopted, with the State paying half the foundation program costs and that the existing program of State financial participation in construction of approved projects be continued. It takes a negative position on extension of college and university facilities through establishment of branches of the State-controlled colleges and universities. On the contrary, it urges that existing branches of the State controlled institutions be reorganized as autonomous institutions and that new college and university facilities be separately organized.

The State study groups are divided on the best way to decentralize college facilities. In Pennsylvania, Virginia, and Wisconsin, in accordance with their study group recommendations, branches of the State university have been established in different locations. The New York and Pennsylvania reports urge establishment of both types of local institutions—junior and community colleges and also branches of the State university structure.[11]

The California report perhaps goes further than the others not only detailing expected future enrollments and the resulting college facilities required, and indicating locations for new units, but also setting priorities in expansion among types of institutions and specifying the educational functions of each type and the minimum, optimum, and maximum full-time enrollments in each.[12] The report recommends reaffirmation of the policy that "no new State colleges or campuses of the university, other than those already approved, shall be established until adequate junior college facilities have been provided" (p. 8). More specifically, this report recommends an increase in the current amounts paid to junior colleges out of State school funds from about 30 percent to about 45 percent by not later than 1975, and adoption of a continuing program of State grants or loans to school districts for construction of junior college facilities. The report also recommends creation of two new State colleges, to be in operation by 1965; completion of the three new State university campuses authorized by the

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[10] John Dale Russell. *Higher Education in Michigan, the Final Report of the Survey of Higher Education in Michigan.* Michigan Legislative Study Committee on Higher Education, Lansing, Mich., September 1958. p. 175.

[11] *See* New York State: Committee on Higher Education. *Meeting the Increasing Demand for Higher Education in New York State, a Report to the Governor and the Board of Regents.* State Education Department, Albany, November 1960; *also* Pennsylvania: Committee on Education. *The Final Report.* Commonwealth of Pennsylvania, Harrisburg, April 1961.

[12] California: The Liaison Committee of the State Board of Education and the Regents of the University of California. *A Master Plan for Higher Education in California, 1960-75.* Sacramento, California State Department of Education, 1960.

State board of regents in 1957; and, in the future, diversion of some potential students *from the Berkeley campus of the* State university to other university campuses.

More effective and efficient utilization of college facilities is urged in each of the major study group reports. The Michigan report, for example, urges such improved utilization as a fiscal necessity, pointing out that the estimated amount that would be required each year over an 18-year period for physical facilities to keep up with the mounting enrollments would be more than the tax-appropriating bodies and philanthropic donors in the State are likely to provide on a continuing basis. The report concludes that: "There seems to be only one solution possible, namely to discover means by which the present ratio of plant facilities to student enrollments can be altered, without damage to the scope and quality of the educational program." [13]

The New York State committee, Henry T. Heald, chairman, reporting in November 1960 to the Governor of New York State and the board of regents, puts the problem of space utilization in this way:

> If the State university were to continue to follow historically accepted space utilization practices during the next 10 to 15 years, appropriations for new buildings to meet the enrollment demand would have to be greater than the grand total provided for college buildings by the legislature during the past century.[14]

Methods of improving utilization of space urged in State study reports include greater use of classrooms in late afternoons and evenings, lengthening of the school week and the school year, better planning of the size and distribution of rooms, and repackaging of course units to fit better into instructional periods available.

Aid to private institutions is proposed in a few States to facilitate expansion of enrollment opportunities. Even when direct financial aid is not extended to such institutions, they are regarded as an integral part of the State's educational capacity, and their facilities are relied upon to help meet emerging enrollment requirements in the State. It is true that the high-quality private college or university is a national institution which draws its students and its financial support from all sections of the Nation, but in most States the in- and out-migrations of students are more or less balanced. Notable exceptions are Massachusetts and New Jersey. In the few States that give direct aid to private institutions, under State constitutional and statutory provisions, such aid takes the form of support for (*a*) current operations, (*b*) scholarships, and (*c*) construction of facilities.

Pennsylvania, a State that has supported private nonsectarian colleges and universities over many decades, continues to stand first among the States in the size of its financial payments to such institutions. In 1957-58, 14 private institutions in Pennsylvania received State support, and the aggregate of these payments amounted to almost $19 million. Payments are made to the aided institutions on a per student basis. The Governor's Committee on Education in its report points out the unique character of Pennsylvania's aid program, but emphasizes that no "measurable" program goals for it have been established over the years. The committee recommends that goals be set for the period ahead—goals that would give assurance of expanded enrollments in the aided private institutions.[15]

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[13] John Dale Russell, op. cit., p. 57.

[14] New York State: Committee on Higher Education, op. cit., p. 32.

Eighteen States and Puerto Rico provide scholarships that students may use either at public or private institutions. New York State has by far the largest of these programs, and further expansion has been proposed by the Heald committee and also by the State board of regents.[16] In other States also, new and expanded scholarship programs are proposed.

Assistance given to privately controlled colleges for construction of facilities, when such assistance is available, is as a rule limited by the States to self-financing loans. However, aid to private institutions in meeting their specialized facility needs has been extended in other ways. For example, the new medical school at Seton Hall in New Jersey has been given the use of the city hospital for clinical teaching, and the University of Miami has a similar arrangement with Dade County.

Financial aid to students.—The availability of facilities is only part of the problem of assuring opportunities for college going; another, is the financial ability to go to college. An important factor facilitating larger college enrollments has been the improved accessibility of colleges—an accessibility that makes the student aware of potential resources for an advanced education and at the same time reduces the cost of his college going by permitting him to live at home while attending. Report after report from the State study groups emphasizes that, if opportunities for college going are to be provided to the greatest possible number of young people, institutions of higher education must be distributed widely throughout the State.

Historically the primary instrument used by States to insure educational opportunities is low or no student tuition. More recently attention has been given to the costs of attending college other than tuition charges, and policy issues have linked tuition charges and scholarships. State study commissions generally reaffirm a policy of low or no tuition, such as that set forth in the early State constitutions of the Midwestern States which recommend that tuition should be gratis and equally open to all. The California report introduces its recommendation on student fees with: "The two governing boards reaffirm the long established principle that State colleges and the University of California shall be tuition free to all residents of the State."[17] In most States where no student tuition is required, however, fees are imposed as charges for specific services of benefit to the student, such as health, counseling, placement, housing, and recreational services.

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[15] Pennsylvania: Committee on Education, op. cit., p. 19.

[16] New York State: The University of the State of New York. *Investment in the Future: The Regents Proposals for the Expansion and Improvement of Education in New York State 1961.* Albany, N.Y., the State Education Department, December 1960.

Essentially there is at issue, as evidenced by the State reports, an important question of eligibility that relates not only to public higher education but to most other public services: Is the service to be available without charge to all qualified individuals who seek it, or only to those who demonstrate financial need? The notion that tuition charges be imposed where none had been levied before, or that they be increased, is contrary to widely accepted educational policies in many States and cannot be expected to gain easy acceptance.

However, publicly controlled colleges, between 1953 and 1960, increased student tuition and other charges each year on the average about 5 percent—a rate only somewhat less than the increase in private institutions. In the 7-year period 1953–60, tuition rates rose 47 percent in all institutions combined, and 36 percent in public ones. In many States increases in student fees came in response to the sharp pressure of advancing costs of higher education, despite the institutions' adherence to a general policy of charging no or low tuition.

Unlike other State reports, the New York report does not back into a recommendation for increases in tuition or student fees, but espouses a statewide tuition policy for all public institutions of higher education. It called for a uniform $300-a-year tuition charge "at all public colleges in New York State—including units of the State university, the community colleges, and institutions in the New York City college system."[18] In recommending this tuition charge, the committee has this to say: "Decisions on tuition made ten, twenty, or even a hundred years ago are no longer relevant and should be changed now that financial demands are mounting. . . ."

A tuition-rebate plan and increases in scholarship aid were recommended by the committee for students whose family incomes are low. The committee noted that "a tuition-rebate plan administered by student-aid officials of the various colleges in accordance with general specifications laid down by the legislature, and making special provisions for hardship cases, can prevent tuition from being a burden on students truly in need."[19] This recommendation was supported by the New York State Board of Regents [20] and adopted by the legislature in 1961.

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[17] California: The Liaison Committee of the State Board of Regents of the University of California, op. cit., p. 14.

[18] New York State: Committee on Higher Education, op. cit., p. 35.

[19] Ibid., p. 35.

While some States are expanding student assistance by means of scholarship grants through public colleges and universities,[21] others, as is noted above, have adopted statewide programs in which students may use the scholarship grants to finance their attendance either at public institutions or at private ones, as the student elects. In recognition of the nature of the costs other than tuition, to students attending college, California has proposed subsistence grants to State scholarship recipients, up to the amount required to defray living costs while the student is at college.

The amount of State scholarship support is shown in table 6 for States spending $1 million or more for scholarship aid. Financial aid to students through scholarships, fellowships, and awards tends to be much lower in the South than in the other areas of the Nation. In 1959–60 eight of the Southern States spent less than $3 per person of college age in the State for that purpose. Other States with low scholarship expenditures per person of college age were Massachusetts and Rhode Island, as well as Kansas, Ohio, and South Dakota (table 7).

TABLE 6.—States spending $1 million or more for scholarship and other student aid, 1959–60

[In thousands]

State	Total	In public colleges [1]	Other programs [2]	Percentage change 1957–58 to 1959–60
Total in States spending $1 million or more	$40,271	$25,543	$14,728	54
New York	9,906	125	9,781	46
California	4,770	3,678	1,092	90
Illinois	4,440	3,374	1,066	79
Michigan	4,028	4,028	....	20
Virginia	2,239	1,345	894	22
Wisconsin	1,797	1,797	....	28
Louisiana	1,617	731	886	54
Oregon	1,555	1,555	....	121
Florida	1,406	1,365	41	−12
Ohio	1,350	1,350	....	68
Colorado	1,329	1,321	8	50
Iowa	1,315	1,315	....	53
New Jersey	1,286	870	416	143
Pennsylvania	1,110	1,069	41	51
Indiana	1,069	1,069	....	199
Alabama	1,064	561	503	90

[1] Represents scholarship aid and other student assistance expenditures of State colleges and universities.
[2] Additional State scholarship aid and administrative expenses connected therewith.

SOURCE: Computed from unpublished data compiled from State fiscal officers and from the Office of Education by the U.S. Department of Commerce, Bureau of the Census, for *Compendium of State Government Finances in 1960.*

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[20] New York State. The University of the State of New York, op. cit., p. 31–32.

[21] Detailed descriptions of student aids are included in: Richard C. Mattingly, *Financial Aid for College Students: Graduate,* U.S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1957 No. 17; and Theresa Birch Wilkins, *Financial Aid for College Students: Undergraduate,* U.S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1957 No. 18.

TABLE 7.—State scholarship aid[1] to students, per person 18-24 years of age in State, 1959-60

State	Amount per person 18-24 years of age [2]	Percent U.S. average
Vermont	$16.90	463
Wyoming	13.15	360
Oregon	11.01	302
Delaware	8.85	242
Colorado	8.16	224
New York	7.51	206
Arizona	6.84	187
Michigan	6.25	171
New Mexico	6.07	166
New Hampshire	5.89	161
Iowa	5.75	158
Nebraska	5.64	154
Wisconsin	5.57	153
Virginia	5.40	148
Louisiana	5.39	148
Illinois	5.34	146
Montana	4.77	131
Hawaii	4.58	126
Oklahoma	4.50	123
Minnesota	4.49	123
West Virginia	4.26	117
Washington	3.92	107
UNITED STATES	3.65	100
Maryland	3.51	96
Alabama	3.48	95
California	3.42	94
Florida	3.35	92
Utah	3.28	90
Maine	2.99	82
Arkansas	2.96	81
New Jersey	2.82	77
Nevada	2.74	75
Indiana	2.60	71
North Dakota	2.44	67
Idaho	2.25	62
Mississippi	2.22	61
Connecticut	2.13	58
North Carolina	2.00	55
Tennessee	1.86	51
Missouri	1.72	47
Alaska	1.71	47
Georgia	1.70	47
Ohio	1.65	45
Massachusetts	1.58	43
South Dakota	1.37	38
Pennsylvania	1.24	34
Kansas	1.22	33
Rhode Island	1.20	33
Texas	1.09	30
Kentucky	.96	26
South Carolina	.70	19

[1] Includes scholarship aid and other student assistance expenditures of State colleges and universities, and also additional State scholarship aid through other public programs and the administrative expenses connected therewith.

[2] Computed using population 18-24 years of age from 1960 *Census of Population*, U.S. Department of Commerce, Bureau of Census.

SOURCE: Computed from unpublished data compiled from State fiscal officers and from the Office of Education by the U.S. Department of Commerce, Bureau of the Census, for *Compendium of State Government Finances in 1960*.

Improved methods of student selection.—States continue to accept the principle that all high-school graduates should have access to higher education if they so elect. They recognize that opportunities for advanced education are not only a matter of accessible physical facilities and of student financial aids, but also of fitting the student to the college and the college to the student. Dropouts that result from improper placements are wasteful, both of public funds and of student energies.

The California study group goes further than the others in recommending classification of applicants for admission and restrictions on State university enrollments. It recommends that (*a*) all high school graduates be eligible for enrollment in junior colleges, (*b*) State colleges select first-time freshmen from the top one-third of all graduates of California public high schools, and (*c*) the University of California select from the top one-eighth. In discussing the effect of the proposed admission policy on the opportunity of graduates of California public high schools to continue their education in publicly supported institutions in the State, the committee concludes that the plan, with its complementary provision for student transfers, "will not reduce the opportunity for students able and willing to meet the requirements for transfer to the upper division in the State colleges and the University of California."[22]

II. Development of Manpower Capabilities

Not only do the States have a responsibility for assuring educational opportunities for their young people, the number of whom grows with each census, but they also have a responsibility for improving the quality of the higher education provided. The quality of such education determines whether the talents of the students will be developed so that "they are able to guard the sacred deposits of the rights and liberties of their fellow citizens." And because the quality of higher education determines the effectiveness of the services to the public—in medicine, in teaching, in the civil service—of persons who are college or university graduates, State governments necessarily have a vital stake in the quality of the graduates. It is clear that maintenance of the educational levels of prior years is not enough at this time of unmatched scientific progress and technological advance. States seek to develop the capabilities of the citizens through a series of measures—measures urged to improve quality of higher education; namely, (*a*) a broad range of opportunities for study beyond the high school, and (*b*) adequate financial support.

MEETING MANPOWER NEEDS

A number of steps have been taken by the States to help meet the needs of their residents for the services of professionally and technically trained people, and additional steps are proposed by State study groups. Although these action programs differ, they have common purposes, and the differences largely reflect the peculiar demographic, geographic, economic, and educational characteristics of the States. Among the steps taken by the State governments, or proposed to them, are the following:

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[22] California: The Liaison Committee of the State Board of Education and the Regents of the University of California, op. cit., p. 72.

Expansion of facilities for graduate and professional training.

An increase in fellowships and other financial aids for graduate students.

Expansion of facilities for technical and semiprofessional training.

Interstate and regional cooperation in providing graduate and professional education.

Statewide coordination of facilities for higher education, together with identification of the functions of each of the types of such facilities, and centralization of specialized high-cost facilities for graduate and professional training.

Expanded facilities. In a number of States action has been taken since the end of World War II to expand facilities and opportunities for graduate and professional training. Because of the urgent needs for professional health personnel and the high cost of medical education, considerable attention is directed to this special area. I have noted earlier in this chapter the important part played by the public universities in expanding opportunities for medical education during the past decades. Establishment of new educational centers for the training of physicians, nurses, dentists, and others in the health professions is being urged by national, regional, and State groups.[23]

In New York State alone, which now has 10 medical schools, construction of "two or three new medical schools within the next 10 to 15 years" is proposed by the Heald committee.[24] Arizona, California, Connecticut, Indiana, Maine, Massachusetts, Michigan, Minnesota, Montana, New Jersey, New Mexico, Ohio, Rhode Island, and Texas have authorized or given consideration to new medical schools. State grants to private medical schools also are recommended in New York to enable such schools to expand their teaching facilities.

The expansion programs are not limited to schools training for the health professions. State colleges have been given university status in increasing numbers to emphasize graduate education, and additional graduate education centers have been recommended in some States. Teachers colleges in a number of States have been converted into liberal arts (general purpose) colleges, and in a number of others recommendations for such action are being discussed.

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[23] See Frank Bane. Organizing Medical Education To Meet Health Needs. *The Annals*, American Academy of Political and Social Science, 337: 29-35, September 1961; *also* Report of the Surgeon General's Consultant Group on Medical Education. *Physicians for a Growing America.* U.S. Department of Health, Education, and Welfare, Public Health Service, Washington, D.C., 1959.

[24] New York State Committee on Higher Education, op. cit., p. 37.

Fellowship and loan programs.—Several States have implemented, or are considering financial aid programs designed to encourage study in specialized fields. For example, California's study committee urges establishment of a new State graduate fellowship program to divert more college graduates into teaching and graduate study. In New York State which has a small graduate fellowship program, the Heald committee proposed "liberal financial aid" for undergraduate medical students and for interns and resident physicians at hospitals.

Typical financial aid programs now existing in several States are designed primarily to encourage training in the specialized fields of teaching, nursing, and medicine, and in some of these States student aid carries with it the obligation to work in the State for a designated period after graduation.

Expansion of technical training programs.—The concern of State governments with manpower needs is not limited to graduate and professional workers. The Council for the Study of Higher Education in Florida, reporting to the Board of Control of the State's institutions of higher learning, says:

> The projected developments of the Florida economy indicate the urgent need for expansion of technical, vocational, and semiprofessional programs of education to supplement degree programs in order that more Florida youth may qualify for a role in the developing technological economy of the State.[29]

The junior or community college in many places is looked upon as an appropriate institution to provide training in technical and subprofessional fields that require less than 4 years of college work. Earlier I described recommendations made to expand these facilities as a way of providing undergraduate study and the priority given to them in California, Michigan, and Pennsylvania. In some other States decentralization of undergraduate study is sought through establishment of university branches. The issue of State institutions versus local ones becomes more complex in the light of the requirements of technical and subprofessional training. For one thing, operating and capital requirements of technical curricula are 50 percent to 100 percent higher than of liberal arts ones.[30]

Moreover, a relatively small proportion of all students seek training in any one field during a year. And programs for training in such fields as aeronautical technology, graphic arts, or industrial photography, can only be offered economically in large population centers.

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[29] A. J. Brumbaugh and Myron R. Blee. *Higher Education and Florida's Future,* vol. I, Recommendations and General Staff Report. University of Florida Press, Gainesville, 1956. p. 9.

[30] William P. McClure. "Transition in Junior College Education." In *Financing Education for our Changing Population.* Committee on Educational Finance, National Education Association, Washington, D.C., 1961. p. 90.

Interstate and regional cooperation.—Increasingly there is recognition by the various States of the importance of interstate cooperation, both as an economy measure and as a step toward insuring high-quality education. Three regional education organizations have been established in the United States—the Southern Regional Educational Board, the Western Interstate Commission for Higher Education, and the New England Board of Higher Education. These organizations not only serve as agencies for the administration of interstate agreements in their regions but also, in cooperation with the Governors' Conferences and the Councils of State Governments as well as other groups, and have fostered cooperative planning and programing for educational opportunities in the States in their regions.[27]

Existing regional arrangements in the field of higher education usually cover professional education in medicine, dentistry, veterinary medicine, and in some instances public health and social work. Among the purposes of existing regional arrangements are the following: (*a*) to enable States without specified types of professional or graduate training facilities to provide educational opportunities for their residents, (*b*) to strengthen institutions providing regional professional or graduate programs, and (*c*) to save the costs that would be involved in construction of expensive facilities for such programs of their own. Under regional arrangements students from participating States enroll in colleges and universities in member States, with the home States paying agreed-upon amounts per student to the receiving institution. The students attending under these programs pay the same tuition fees as State residents.

The survey of higher education in North Dakota emphasizes the importance of interstate compacts and arrangements as a way to provide specialized educational opportunities in a State with a relatively sparse population. The report notes that "Under these contracts students can without extra financial burden to themselves attend institutions outside their own State to study programs not offered by colleges in their home State." [28]

Statewide coordination.—Viewing all institutions of higher education in the State as parts of a whole, a number of State study reports urge statewide coordination of facilities for such education.

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[27] See for example, U.S. Public Health Service, W. K. Kellogg Foundation, and American Dental Association. *A Study of Dental Manpower in the West*, Western Interstate Commission for Higher Education [1959?]; Southern Regional Education Board, Financing Higher Education Series, the Board, Atlanta, Ga.; Western Interstate Commission for Higher Education. *Proceedings of the Legislative Workshop on Financing Higher Education*, the Commission, Boulder, Colo., June 1958; and various reports of the New England Board of Higher Education.

[28] Ernest V. Hollis, S. V. Martorana, *et al.* *Higher Education in North Dakota, a Report of a Survey*, vol. 1. U.S. Department of Health, Education, and Welfare, Office of Education, October 1958. p. 84.

The objectives of this coordination are many. Among them are development of a greater diversity in educational programs, improvement in quality of specialized training, and reduction of needless duplication.[29]

Such coordination in a State, whether through voluntary action or official requirements by a central board of higher education, requires identification of the distinctive role of each institution. The Texas Commission on Higher Education, for example, has continued to emphasize the State's need for effective statewide coordination. Its report defines the role and scope of each public college and university in the State and suggests an appropriate allocation of functions among them.[30]

The California study report defines the functions of three types of institutions—universities, 4-year colleges, and junior colleges—as was indicated earlier in this chapter.

In the North Dakota report the recommendation on statewide coordination among institutions of higher education is stated as follows:

> The State board of higher education . . . should define the concept of a single statewide system and a policy for developing three types of institutions for achieving the stated objectives. These three types of colleges and their primary functions should be: (1) complex institutions of the university type, predominantly responsible for providing graduate and professional education; (2) 4-year, regional State colleges predominantly responsible for providing programs of teacher education; (3) 2-year colleges of the community junior college type, predominantly responsible for approved specialized programs for technicians and semiprofessional personnel.[31]

In New York, a State that unlike California and North Dakota has relied upon private colleges and universities for the major share of its higher education, the task of coordination and statewide planning has not been neglected. The Heald committee urges a new alinement of the organizational structure of higher education in the State, expansion of responsibilities for planning, and creation of a Council of Higher Education Advisors "to recommend publicly and loudly what ought to be done to keep our system of higher education in line with our needs—statewise, nationally, and in view of the world situation."[32]

ADEQUATE STATE FINANCIAL SUPPORT

Educational opportunities must be provided in the States for the growing numbers of talented young people, and professional and subprofessional education must be developed to meet the needs for trained manpower. But college places of the appropriate kinds are not enough. The major issue confronting the States in the financing of public higher education is: "How are we to finance higher education of the quality required for today's complex society and tomorrow's even greater complexities?"

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[29] Ibid., p. 85.

[30] Texas Commission on Higher Education. *Report to the Governor of Texas and the Legislature of the State of Texas.* Austin, Tex., the Commission, December 1958.

[31] Ernest V. Hollis, S. V. Martorana, *et al.*, op. cit., p. 87–88.

[32] New York State: Committee on Higher Education, op. cit., p. 22.

The Texas Commission on Higher Education poses the question in this way:

> . . . the Commission foresees the emerging challenge to public higher education in Texas in terms of qualitative rather than quantitative considerations. . . . It is not enough for the State to concentrate its attention on meeting the flood of enrollment. Quality must be considered, and indeed it must be emphasized.[illegible]

State performance.—Have the States in the past increased their funds for higher education in the amounts required to improve the quality of education at the same time as they enroll larger numbers of students? In current dollars, State and local funds going to colleges and universities in 1957–58 were 20 times as high as they were in the early 1920's and 3 times as high as they were after World War II. In the 4 years from 1953–54 to 1957–58, the increases in these expenditures averaged about 10 percent a year, and the increases in enrollment in public institutions averaged about 12 percent a year.

Historical comparison of State and local tax funds for higher education, however, is hazardous. Neither the data for State funds nor those for enrollments are statistically comparable. Definitions of the items reported are different from biennial survey to biennial survey, and the completeness of reporting varies. Moreover, State programs change, and they affect the data reported in different ways. Also, an appropriate base year is difficult to select because of the special circumstances existing in each of the years. (See app. C for further explanation of estimates of State and local funds for higher education.)

An analysis of the data for the most recent period, made by combining the available information in different ways, seems to suggest that State and local funds for higher education changed over the last 4-year period roughly by the amount required to accommodate the increased numbers of students in public colleges and universities and did not include a margin for improvement in quality. Using one series on enrollments in the computation, I found that state and local funds per student increased about 7 percent between 1951–52 and 1957–58. With another enrollment series, State and local funds per student were somewhat higher in 1953–54 than in 1957–58. And with still another

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[illegible] Texas: Report to the Governor and the Legislature of the State, op. cit., p. 8.

enrollment series, State and local funds per student were 11 percent higher in 1957–58 than in 1953–54.[34]

Thus the States' performance in the past few years (measured by the amount of State and local funds per student enrolled in public institutions) indicates two things: (*a*) States and localities increased their tax effort for higher education, and (*b*) the increase was pressured by enrollment demands rather than by considerations of quality.

The larger scale of State and local financing for higher education corresponds to that for State and local expenditure for all tax-supported public services. During the period from fiscal year 1949–50 to 1957–58, State and local expenditures for all public services increased from $27.9 billion to $53.7 billion, and a further rise of over 13.5 percent occurred in the next 2-year period. Total State and local expenditures more than doubled in the decade of the 1950's and increased from 9.5 percent to over 14 percent of gross national product.

Future State requirements.—"Can the States finance higher education in the quantity demanded by its citizens and in quality adequate to meet the manpower needs of the State and Nation?" In part the answer to this question patently depends upon the costs of quality education, taking account both of those quality factors that will increase costs and those which may permit reductions. The necessary salary increases in the colleges and universities create an upward push on costs.[35]

State study report after report emphasizes the need for higher salary payments to faculty. For example, the Arizona and West Virginia reports urge better faculty salaries. North Dakota's 1958 report noting that North Dakota institutions were not paying faculty salaries comparable to those in other States, says:

> This fact has serious implications for the welfare of the higher education in the State. . . . The gravity of the situation is made worse by the fact that the level of faculty salaries over the Nation at large is coming to be recognized as dangerously low.[36]

The report recommends that the legislature raise the level of faculty salaries as rapidly as possible, and as a minimum "strive to reach and maintain an average for its faculties that is equal to the average salary level paid personnel of comparable ranks in institutions of like type in the North Central region of the Nation."

The Florida report urges an upward adjustment of salaries as necessary to attract and retain qualified staff in a highly competitive market. The Council for the Study of Higher Education also recommended such an adjustment.[37] New York's Heald committee puts its findings on the subject this way: "Salaries have been too low for many years, with top-grade faculty members substantially subsidizing, in effect, the education of their students." [38]

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[34] The three enrollment series for public institutions were: (*a*) total opening fall enrollments; (*b*) opening fall enrollments for resident and extension students (degree and nondegree credit); and (*c*) academic year enrollments for resident students.

[35] Sidney G. Tickton. *Teaching Salaries Then and Now—A Second Look.* New York. The Fund for the Advancement of Education, May 1961.

[36] Ernest V. Hollis, S. V. Martorana, *et al.*, op. cit., p. 87, 88.

While salary adjustments create an upward cost push, improvements in methods of teaching, reorganization of curriculums, and introduction of new techniques in the colleges and universities offer some opportunity for modifying the upward trend. Much new institutional research in the colleges and universities of the States promises improvement both in efficiency and in quality. However, it is generally recognized that the ongoing efforts have to be stepped up. The Heald committee, for example, recommends that the State help colleges and universities to improve their techniques of higher education and urges that a new agency be created in the State to help the institutions create, develop, and adopt new policies and procedures, and to encourage prompt use of new knowledge about administration and educational practices.

Future financial requirements can be defined somewhat more precisely than heretofore, within the framework of illustrative estimates presented in chapter 11 of this publication. If States increased their tax efforts approximately in proportion to the numbers of students enrolled in public colleges and universities, as indicated in table 4, chapter 11, State and local expenditures from tax funds would increase from $1 billion in 1957–58 to $2.9 billion in 1970–71 and to $3.8 billion in 1975–76. If they just maintained their 1957–58 relative tax effort for higher education, State and local support would rise from $1 billion to $2 billion in 1970–71 and to $2.6 billion in 1975–76. The differences between the amounts shown in table 4 and those that would be raised if tax effort were maintained at a constant rate would be added to the amounts required from other sources. If, however, they finance about one-half the current expenditures required, States and localities would have to raise about $4.5 billion in taxes for student higher education by 1970–71 and more than $6 billion by 1975–76.

Recent studies of the changes in State and local tax bases in response to changes in income permit us to translate these State and local contributions into tax rate increases. The studies by Netzer of the Chicago Federal Reserve Bank,[40] by Eckstein for the Committee for Economic Development,[41] and by McLoone of the Office of Education[62] indicate the sensitivity of State and local tax bases to changes in gross volume of national output. While these studies suggest somewhat different changes in State and local tax yields (at constant rates) in response to changes in State income and gross product, the three studies suggest that the State and local tax bases grow almost proportionately to the gross product. Hence a rise in State and local expenditure out of tax funds proportionate to gross national product would require no rate increase. A rise beyond this amount would call for increased taxes, or, stated differently, the growth in the economy will permit a doubling of State and local contributions to student higher education a decade hence without an increase in tax rates; State and local contributions in excess of these amounts will necessitate higher tax rates or new tax levies.

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[37] Brumbaugh *and* Blee, op. cit., p. 54.

[38] New York State: Committee on Higher Education, op. cit., p. 14.

[40] Dick Netzer. "Financial Needs and Resources over the Next Decade: State and Local Governments" in *Public Finances: Needs, Sources, and Utilization*, a Report of the National Bureau of Economic Research. Princeton, N.J., Princeton University Press, 1961.

[41] Otto Eckstein. *Trends in Public Expenditures in the Next Decade.* Washington, D.C., Committee for Economic Development, April 1959.

Writers on problems of financing higher education express sharply divergent views about the ability of the States to meet the mounting needs of higher education. Interstate competition in a highly mobile Nation, where people, goods, and property cross State lines without trade barriers, imposes real limits on tax action by a single State. States tend to be restricted in their tax policy by the taxes imposed by their neighbors. Moreover, there are large unmet needs for other public services of many kinds, and claims on the tax dollar multiply with the rapid development of metropolitan areas.[63] Because of the major reliance on property taxes and sales levies, general or selective, increased State and local taxation means heavier burdens on the low- and middle-income groups than would a comparable Federal tax load.[64]

Interstate differences. Tables 8 to 10 present comparative interstate data on the financing of higher education. Table 8 shows the wide variations in the shares of State and local governments in the financing of educational and general expenditures (excluding research). Table 9 shows the estimated amount of State and local tax dollars for higher education per person 18 to 24 years of age in the States and in the regions; and table 10, the tax money as a percentage of gross personal income of all the residents in the States and in the regions.

Despite wide variations among the States in the share of public funds going toward the teaching of students in colleges and universities, and also the variations in tax effort, each of the State study groups concludes that their State can afford to finance an enlarged public program of higher education. Various indexes of the ability of a State to finance higher education are used in the reports on State studies.[63] These include (*a*) State expenditures for higher education per student or per capita; (*b*) State expenditures for higher education as a percentage of total State outlays or of total tax dollars; (*c*) State expenditures for higher education as a percentage of total personal income in the State. To gain a measure of relative ability, the indexes are compared with the State's own tax effort for higher education historically, and also with that of other States in the same region, with that of States of similar size, and with the Nation as a whole. Projections are made of personal income and of State resources to finance higher education, and changes in tax effort are computed on the basis of the relation of the estimated growth in expenditures for higher education to the growth in the economy of the State.

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[62] Eugene P. McLoone. *The Effects of Tax Elasticity on the Financial Support of Education.* Doctoral dissertation, Urbana, University of Illinois, 1960 (unpublished).

[63] Seymour E. Harris, op. cit., p. 63, and Howard R. Bowen, "Where Are the Dollars for Higher Education Coming From?" in *1960 Current Issues in Higher Education,* Association for Higher Education, National Education Association, Washington, D.C., 1960.

[64] George A. Bishop. The Tax Burden by Income Class, 1958. *National Tax Journal,* 14: 41-58, March 1961.

TABLE 8.—Percent of college and university current income for student higher education from States and local governments, 1957-58

State	Percent of current income from States and localities ¹	State	Percent of current income from States and localities ¹
Montana	74.8	Colorado	50.4
Nevada	74.8	Wisconsin	50.1
North Dakota	74.3	Maryland	49.0
West Virginia	73.4	Alabama	46.9
Washington	70.7	Indiana	46.6
Wyoming	69.6	Utah	45.9
California	69.1		
New Mexico	68.3	UNITED STATES	43.7
Idaho	67.4		
Louisiana	66.5	Illinois	42.0
Arizona	65.0	Virginia	41.9
		Georgia	39.9
Oregon	64.3	Kentucky	38.0
Michigan	60.9	North Carolina	36.3
Oklahoma	60.4	Tennessee	35.7
Hawaii	59.5	Missouri	34.1
Alaska	59.3	Ohio	31.5
Arkansas	58.5	Maine	30.8
Kansas	57.3		
Florida	55.6	New Jersey	29.5
Mississippi	55.4	Vermont	29.0
Nebraska	55.0	New York	26.0
South Dakota	54.8	New Hampshire	25.3
		Connecticut	24.2
Delaware	54.2	Rhode Island	24.1
Minnesota	52.6	Pennsylvania	22.9
Iowa	52.5	Massachusetts	8.3
Texas	52.0	District of Columbia	6.6
South Carolina	51.8		

¹ State and local funds reported by colleges and universities (less funds for research) as a percentage of total current income for educational and general purposes as adjusted to exclude funds for organized research and agricultural experiment stations and income for organized activities related to educational departments and sales and services of these departments after deduction of corresponding income items.

SOURCE: Computed from U.S. Department of Health, Education, and Welfare, Office of Education, unpublished preliminary data, compiled for *Statistics of Higher Education, 1957-58*, Biennial Survey of Education in the United States, 1956-58, ch. II, table 1, supplemented by information on grants to States from the U.S. Department of the Treasury, *Annual Report of the Secretary of the Treasury, for the fiscal year ended June 30, 1958*, and by other unpublished data from the Office of Education on State and local research funds.

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[63] *See, for example,* James W. Martin *and* Kenneth E. Quindry. *Southern States and New Revenue Potentials*, Research Monograph Series No. 1, Atlanta, Ga., Southern Regional Education Board, 1960.

TABLE 9.—State and local funds for higher education and scholarship expenditures, 50 States and District of Columbia, 1957-58

[Totals in millions]

State	Total current and capital funds	Current funds, only	
		Amount [1]	Per person 18-24 years of age [2]
50 STATES AND DISTRICT OF COLUMBIA	$1,732.6	$1,289.7	$81
NEW ENGLAND	74.5	37.1	43
Maine	8.0	3.6	43
New Hampshire	4.6	3.7	72
Vermont	3.3	3.3	96
Massachusetts	18.1	11.4	27
Rhode Island	14.8	3.6	45
Connecticut	25.7	11.5	60
MIDEAST	216.9	166.7	54
New York	120.6	87.1	66
New Jersey	25.4	17.5	38
Pennsylvania	39.5	36.6	41
Delaware	4.4	3.2	83
Maryland	25.2	20.5	76
District of Columbia	1.8	1.8	22
GREAT LAKES	381.2	277.6	92
Michigan	107.4	90.7	141
Ohio	75.7	40.9	50
Indiana	49.8	38.5	94
Illinois	105.4	78.0	94
Wisconsin	42.9	29.5	91
PLAINS	165.6	137.2	105
Minnesota	44.8	33.5	118
Iowa	29.5	28.6	125
Missouri	29.1	21.5	59
North Dakota	9.9	8.7	155
South Dakota	7.4	7.2	124
Nebraska	17.1	14.7	124
Kansas	27.8	23.0	120
SOUTHEAST	282.8	219.6	59
Virginia	29.9	21.4	52
West Virginia	16.4	15.9	101
Kentucky	21.1	12.0	42
Tennessee	20.7	15.5	46
North Carolina	34.0	22.7	48
South Carolina	12.3	12.3	49
Georgia	19.8	17.9	45
Florida	37.5	27.1	65
Alabama	18.9	16.0	52
Mississippi	16.7	12.4	60
Louisiana	42.6	33.5	112
Arkansas	12.9	12.9	85
SOUTHWEST	125.5	109.5	82
Oklahoma	21.6	21.2	100
Texas	78.1	68.4	75
New Mexico	9.8	9.0	94
Arizona	16.0	10.9	89
ROCKY MOUNTAIN	58.9	50.1	127
Montana	13.5	11.9	208
Idaho	7.4	6.6	113
Wyoming	4.8	4.8	172
Colorado	21.9	16.7	102
Utah	11.3	10.1	113

See footnotes at end of table.

TABLE 9.—State and local funds for higher education and scholarship expenditures, 50 States and District of Columbia, 1957–58—Continued

State	Total current and capital funds	Current funds, only	
		Amount [1]	Per person 18–24 years of age [2]
FAR WEST	$427.3	$270.5	$141
Washington	45.6	35.2	142
Oregon	29.3	22.0	156
Nevada	4.6	2.5	98
California	340.7	205.4	147
Alaska	2.6	1.7	52
Hawaii	4.5	3.6	50

[1] Includes State and local funds other than research reported as current income or plant funds by colleges and universities and also State scholarship aid expenditures and other expenses of State higher education agencies. (See app. D, table 1, for estimates of local funds for higher education.)

[2] Computed using population 18–24 years of age from 1960 Census of Population, Bureau of Census.

SOURCE: Computed from U.S. Department of Health, Education, and Welfare, Office of Education, unpublished data compiled for *Statistics of Higher Education, 1957–58*, Biennial Survey of Education in the United States, 1956–58, ch. 4, sec. II, tables 1 and 3, and from unpublished data compiled from State fiscal offices by the U.S. Department of Commerce, Bureau of the Census, for the *Compendium of State Government Finances in 1958.*

TABLE 10.—State and local "effort" for higher education, including scholarship expenditures, 50 States and District of Columbia, 1957–58

State and region	Current fund expenditures [1]	
	Per capita [2]	Percent of personal income in State [3]
50 STATES AND DISTRICT OF COLUMBIA	$7.50	0.4
NEW ENGLAND	3.81	.2
Maine	3.94	.2
New Hampshire	6.48	.3
Vermont	8.89	.5
Massachusetts	2.39	.1
Rhode Island	4.30	.2
Connecticut	5.08	.2
MIDEAST	4.54	.2
New York	5.41	.2
New Jersey	3.15	.1
Pennsylvania	3.32	.2
Delaware	7.42	.2
Maryland	7.32	.3
District of Columbia	2.31	.1
GREAT LAKES	7.96	.4
Michigan	11.82	.5
Ohio	4.44	.2
Indiana	8.55	.4
Illinois	8.08	.3
Wisconsin	7.65	.4
PLAINS	9.08	.5
Minnesota	10.12	.5
Iowa	10.29	.6
Missouri	5.12	.3
North Dakota	13.51	.9
South Dakota	10.50	.6
Nebraska	10.32	.5
Kansas	11.17	.6

See footnotes at end of table.

TABLE 10.—State and local "effort" for higher education, including scholarship expenditures, 50 States and District of Columbia, 1957-58—Continued

State and region	Current fund expenditures [1]	
	Per capita [2]	Percent of personal income in State [3]
SOUTHEAST	$6.00	0.4
Virginia	5.83	.3
West Virginia	8.13	.5
Kentucky	3.98	.3
Tennessee	4.53	.3
North Carolina	5.18	.4
South Carolina	5.34	.4
Georgia	4.85	.3
Florida	6.56	.3
Alabama	5.11	.4
Mississippi	5.78	.6
Louisiana	11.08	.7
Arkansas	7.36	.6
SOUTHWEST	8.36	.5
Oklahoma	9.54	.5
Texas	7.61	.4
New Mexico	11.23	.6
Arizona	10.04	.5
ROCKY MOUNTAIN	12.27	.6
Montana	17.80	.9
Idaho	10.27	.6
Wyoming	15.49	.7
Colorado	10.29	.5
Utah	12.03	.7
FAR WEST	10.29	.5
Washington	13.25	.6
Oregon	12.64	.6
Nevada	10.08	.4
California	15.17	.6
Alaska	10.16	.3
Hawaii	6.48	.3

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[1] For definitions and amount of expenditures, see table 9.

[2] Computed using estimated civilian population on July 1, 1957, Bureau of the Census, *Current Population Reports*, Series P-25, No. 208, Dec. 7, 1959.

[3] Computed from U.S. Department of Commerce, Survey of Current Business, August 1959, average income for calendar year 1957-58.

SOURCE: Computed from U.S. Department of Health, Education, and Welfare, Office of Education, unpublished data compiled for *Statistics of Higher Education, 1957-58*, Biennial Survey of Education in the United States, 1956-58, sec. II, tables 1 and 3, and from unpublished data compiled from State fiscal offices by the U.S. Department of Commerce, Bureau of the Census, for the *Compendium of State Government Finances in 1958*.

III. Fostering Economic Growth

We have previously discussed the financial problems facing the States in providing higher education opportunities for the rapidly growing number of students and in developing the necessary manpower capabilities. We turn now to the impact of higher education on the economic development of the State and the way in which this impact alters the financial problems. Increasingly, Governors, legislatures, and educational agencies are coming to regard higher education as an important component of economic planning in the States, and the financing of higher education as an investment in economic development.

Rapid advances in science and technology give new perspective to the role of colleges and universities. New industries, with their promise of accelerated growth, originate in the research laboratory. Research and development outlays of industries are growing rapidly and evidence the payoff of research. The facilities for this development work often are located in areas where the manpower and resources for research are most favorable—university centers. The U.S. Department of Commerce's Office of Area Development, in reporting a discussion among officials of problems of industrial location—including officials from the aircraft, pharmaceutical, and electronics industries—listed characteristics of preferred sites for research and development facilities. Among the characteristics of these sites were a ratio of at least 2 engineers per 1,000 population; 1 Ph. D. per 1,000 population; good library facilities; and opportunities for continued higher education.[66]

University centers attract new industries by providing a community environment favorable to cultural and scientific activities.[67] Such centers facilitate the recruitment and retention of professional and scientific personnel by a company located close by. The centers afford employees of the company access to opportunities for continuing their education and also provide a pool of talent to draw upon for consultative services.[68]

University centers thus are linked with industrial development in the community and State in which they are located. The State's contribution toward the financing of these centers becomes a part of its contribution toward economic growth in the community and the State—an investment that pays dividends in expanded fiscal resources, improved public services, and employment opportunities.

The gains to the State's industrial development from university centers of graduate study and research are a further justification of State taxpayer support of these centers. Brumbaugh states the problem as follows: "The real challenge in Florida during the years ahead is not to find ways by which the economy will be able to support higher education, but rather to devise ways in which programs of research, service, and instruction in higher education can support potential developments." [69] Perhaps in a more detailed way than in other States the report of the Florida Council for the Study of Higher

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[66] U.S. Department of Commerce, Business and Defense Services Administration, Industrial Location Division, *Factors Influencing the Location of Research and Development Facilities* (processed), Mar. 19, 1959; also *Notes on Plant Location Seminar* (processed), Nov. 9-16, 1959.

[67] Asa S. Knowles. The Influence of Industries on Local Academic Programs. *The Educational Record*, 42: 179-182, July 1961.

[68] S. V. Martorana and Archie R. Ayers. Industry Likes To Locate Near a College or University. *College and University Business*, 29: 29-32, October 1960.

[69] Brumbaugh and Blee, op. cit., p. 6.

Education deals with the economy of the State as a backdrop for its survey of higher education needs.[30]

Of direct concern to the State officials is the magnitude of funds granted to research centers in universities by private and Federal agencies. Concentration of private and Federal research funds in prestige institutions has set off a chain reaction that intensifies the urgent need for attracting and retaining well-recognized scholars and research workers, particularly in the physical and biological sciences. The financial requirements of the State university centers are increased as a consequence. But the support from sources other than State taxes is increased as well.[31]

Although most of the State groups concerned with higher education have not emphasized the economic benefits of higher education, few lose sight of the fact that higher education itself is a growing "industry." [32]

In summary, most States in the past few years have explored the developing problems of higher education within their borders; less than one out of each five States has made a comprehensive survey of higher educational opportunities for their residents and the financial problems involved. State tax funds for higher education have increased rapidly, but the higher taxes have not been sufficient to gain quality education in the quantity demanded. State interest in college-trained manpower and in industrial expansion based on scientific advances suggests the possibility of new methods of financing, including long-term borrowing. However, faced with the growing financial load for higher education, States in some instances are turning to the cities for a larger share of the costs—cities already burdened with the complex public service needs of metropolitan communities.

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[30] Wylie Kilpatrick. *Florida's Economy—Past Trends and Prospects for 1970*, vol. 2 of Higher Education and Florida's Future. Gainesville, University of Florida Press, 1956.

[31] The effect of research on the finances of higher education is discussed in ch. 18 of this publication.

[32] See, for example, S. V. Martorana, Ernest V. Hollis, *et. al.*, *Higher Education in South Dakota, a Report of a Survey*, vol. 1, U.S. Department of Health, Education, and Welfare, Office of Education, September 1960; and James W. Harvey, *The University and the City, a Study of Economic Relationships Between the University of California and the City of Berkeley*. Berkeley, University of California Bureau of Public Administration, December 1958 (processed); and various reports by the New England Board of Higher Education, the Southern Regional Education Board, and the Western Interstate Commission for Higher Education.

CHAPTER 15

Corporate Support of Higher Education

*Robert J. Pitchell**

CORPORATIONS increasingly have recognized the importance of institutions of higher education as a base of research and a source of trained manpower. Post-World War II shortages of manpower, particularly in science and engineering, have emphasized the close ties of business corporations with the universities and colleges. Corporations have expanded recruitment in the colleges and participated in programs designed to attract additional students into science, engineering, and business administration. They have reached back into the high school to encourage young people through scholarships and traineeships to further their education. And they have helped in raising the scientific preparation of high-school teachers through exchange and other programs between industry and colleges. Many corporations have financed advanced education for some of their employees as a way to aid in the recruitment and retention of needed trained manpower.

The role of research in industrial development has long been recognized. Some of the more important industrial laboratories date back before the present century. But since World War II the acceleration of scientific advances and technology has produced new requirements for industrial research. Indeed, industrial research and development have been accelerated by more widespread recognition of the profitability and payoff of research. Industry's research and development bill amounted to $8.2 billion in 1958; it is estimated at $10 billion in 1960.[1]

There is every indication that the pace of innovation will be further accelerated in the decade ahead. While research conducted by industry in its own laboratories is concerned principally with application of knowledge to specific improvements of products and processes of production, expansion of basic research is recognized more and more as the cornerstone of applied research.

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*Associate director, Bureau of Government Research, Indiana University.

[1] National Science Foundation, *Reviews of Data on Research and Development*, 24:1, December 1960.

The story of corporations and higher education is not unlike the story of government and higher education, or that of any other segment of our society and higher education. It is a story of increased dependence on colleges and universities and greater responsibility for these institutions. The more complex the base from which we start, the greater the complexity of advancing further. The knowledge of simple mechanics and mechanical arts needed in the 19th century is no longer the basis of technological progress. The transformation is dramatized by man's achievement in outer space and is brought coldly home in the destructive force of his splitting of the atom. When machines are constructed that think and remember, the challenge to human brainpower becomes not less but more. And it is in this climate that business firms are reassessing their benefits from investment in education and their obligations for contributing to development of the Nation's brainpower.

The financial contributions of corporations to higher education take many forms. Some corporate funds go out in the form of educational fringe benefits to employees or even more directly to training of employees as an expense of business. Some represent contractual payments for research performed. Still other funds represent charitable giving. Some of the corporate funds spent for higher education go directly into the financial accounts of colleges and universities. Others are given as financial aid to students directly by the corporations and do not appear in the financial accounts of the colleges and universities as corporate funds. Some corporate funds are contributed through foundations; other amounts are paid directly without an intermediary. This brief description is not intended to set up a precise classification of forms or methods of corporate contributions, but to suggest that the data available on amounts of corporate contributions to higher education often relate to specific forms of support and exclude others.

EDUCATION AND TOTAL CORPORATE GIVING

Corporate giving for all philanthropic purposes (defined to accord with the definitions of "contributions" reported by corporations under the Federal internal revenue laws) amounted to $395 million in 1958 and is expected to almost double by 1970 (table 1). In the prior 12-year period from 1946 to 1958, corporate giving for all philanthropic purposes rose from $214 million to $395 million. Charitable and educational giving amounted to 1 percent of corporate net profits before taxes.

The amount of corporate funds used for educational and welfare purposes, is greatly understated by such data. For example, corporations have been expanding their provisions for health and other insurance protection for their employees at the same time as they have been increasing educational services and benefits for them. These activities properly become an expense of doing business and are not charitable or educational "giving," but the impact and effects in the community as a whole are not very different from the effects of philanthropic activities.

TABLE 1.—Corporate philanthropic contributions, amount and as percent of profits before taxes, by year, 1936–58

[Amounts in millions]

Year	Total corporate profits	Contributions	
		Amount	Percent of profits
1936	$7,771	$30	0.39
1937	7,830	33	.42
1938	4,131	27	.65
1939	7,178	31	.43
1940	9,348	38	.41
1941	16,675	58	.35
1942	23,389	98	.42
1943	28,126	159	.57
1944	26,547	234	.88
1945	21,345	266	1.24
1946	25,399	214	.84
1947	31,615	241	.76
1948	34,588	239	.69
1949	28,387	223	.78
1950	42,613	252	.59
1951	43,495	343	.78
1952	38,245	399	1.03
1953	39,801	495	1.24
1954	36,721	314	.86
1955	47,949	415	.87
1956	47,413	418	.88
1957	45,073	419	.93
1958	39,224	395	1.01

SOURCE: U.S. Treasury Department. *Statistics of Income*, Corporation Income Tax Returns.

Figures that are directly comparable, showing the distribution of these contributions by purpose, are not available. However, survey data throw some light on the pattern of corporate giving (table 2). The major share of corporation funds goes for welfare, health, and education. Changes in the distribution of corporation contributions since 1947 and even since 1955 indicate that education is getting an increasingly larger share of total corporate giving. The relative share for education has almost tripled since 1947. Moreover, a part of the giving for other purposes, such as gifts to voluntary health agencies, are in turn devoted to purposes that channel funds into colleges and universities. In 1958, for example, about $30 million of the income received by voluntary health organizations through contributions was devoted to research, and a substantial share of this amount was for research in colleges and universities. About $9 million was spent for research by the American Cancer Society, and a similar amount by the American Heart Association.[2]

TABLE 2.—Percentage distribution of corporate contributions, by area of support, 1947, 1948, 1955, and 1959[1]

Area of support	1947	1948	1955	1959
Total	100.0	100.0	100.0	100.0
Community chests and united funds	31.3	40.3	26.4	23.1
National health agencies	2.6	1.7	1.3	1.6
Hospitals	13.1	17.5	8.6	10.8
Education	13.4	14.2	31.3	30.1
All other	39.2	26.7	32.4	33.7

[1] Data derived from surveys conducted by the National Industrial Conference Board and reported for [illegible] in The Conference Board Business Record. New York, National Industrial Conference Board, [illegible] and June 1961, p. 10 for 1955 in Company Contributions: III, Policies and Procedures [illegible] New York, National Industrial Conference Board, Inc., [illegible] by these data covered 71 corporations in 1947, 79 corporations in 1948, 180 [illegible]

The Council for Financial Aid to Education has estimated that something over $136 million was given by American business concerns (including company foundations) to higher education in 1958.[3] This includes extensive grants in the form of fellowships and scholarships given directly to students. Business gifts given directly to institutions of higher education in the college fiscal year 1958–59 amounted to $98.5 million, according to the council. Of the total, $68.9 million was given for current operations and $29.6 million for capital purposes. The money was contributed for the following purposes.[3]

Purpose	Amount (millions)	Percent
Total	$98.5	100.0
Unrestricted use	26.2	26.7
Physical plant	24.7	25.0
Research	20.5	20.8
Student aid	15.3	15.5
Faculty compensation	3.7	3.8
Other purposes	8.1	8.2

A roughly similar picture emerges from data compiled by Selma Mushkin and Eugene P. McLoone of the Office of Education, U.S. Department of Health, Education, and Welfare (table 3).

Previous surveys by the Council for Financial Aid to Education in 1954–55 and 1956–57 indicate that the proportion of unrestricted gifts from business concerns has been increasing, as has that of indirect gifts given to colleges and universities through State, regional, and other joint fundraising associations, which then redistribute the gifts to the member educational institutions.

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[2] *The Conference Board Business Record.* New York, National Industrial Conference Board. June 1961.

[3] *Voluntary Support of America's Colleges and Universities, 1958–1959.* New York, Council for Financial Aid to Education, 1959. p. 69.

TABLE 3.—Gifts and grants by foundations and corporations or other business firms to colleges and universities, academic year 1957–58 [1]

[In thousands]

Purpose	All colleges and universities	Public colleges and universities	Private colleges and universities
Gifts and grants for—			
All purposes	$198,510	$52,769	$145,739
Corporations and other businesses	76,148	22,398	53,748
Foundations	122,362	30,371	91,991
Current operation	105,649	39,537	66,112
Corporations and other businesses	55,838	19,682	36,156
Foundations	49,811	19,855	29,956
Plant funds	45,193	10,031	35,162
Corporations and other businesses	12,508	1,270	11,238
Foundations	32,685	8,761	23,924
Endowment funds	47,055	2,909	44,146
Corporations and other businesses	7,590	1,395	6,195
Foundations	39,465	1,514	37,951
Other special funds	613	292	319
Corporations and other businesses	212	51	159
Foundations	401	241	160

[1] Computed by Selma J. Mushkin and Eugene P. McLoone from unpublished preliminary data compiled for *Statistics of Higher Education, 1957–58*, Biennial Survey of Education in the United States, 1956–58, ch. 4, sec. II, table 1. U.S. Department of Health, Education, and Welfare, Office of Education.

The council also reports that corporations and business concerns increased their contributions to higher education by 149.7 percent from academic year 1954–55 to 1958–59. However, most other groups of donors increased contributions at a higher rate than business concerns (table 4). Perhaps the most interesting and significant part of the table concerns the high level of contributions from individuals and from government. Alumni and other individuals contributed $281.9 million, or 37.5 percent of the total, in 1958–59, and voluntary contributions from governments amounted to 16.6 percent of the total.

Corporate and foundation giving (table 3) amounts to less than 5 percent of total current-fund income of institutions of higher education. In contrast, total payments from government amount to 42.7 percent of current fund income. Overall, corporations appear to be increasingly aware of their responsibilities to higher education. They are increasing their contributions. Yet their gifts do not constitute a large share of total funds for higher education, and they remain one of the great, largely untapped reservoirs of support.

TABLE 4.—Voluntary contributions, by groups of donors to institutions of higher education, 1954-55 and 1958-59

[Amounts in millions]

Donors	1954-55	1958-59	Percent change
Governments[1]	$29.9	$124.8	+318.1
Individuals and/or families[2]	30.9	129.3	+318.1
Alumni	52.1	152.6	+192.9
Nonalumni, nonchurch groups	18.7	52.4	+180.2
Governing boards	9.7	24.4	+151.5
Business concerns	39.4	98.4	+149.7
General welfare foundations	50.2	88.3	+75.8
Religious denominations	42.9	64.2	+49.8
Other sources	15.3	16.9	+10.5
Bequests, trusts, annuities	47.0	(3)	(3)
Total	336.1	751.3	123.5
Institutions reporting	728	1,071	+47.1

[1] Does not include appropriations or other specific grants made by statute.

[2] Covers individuals and families not included in other groups.

[3] These gifts were credited to donors in other categories in 1958-59.

SOURCE: Council for Financial Aid to Education. *Voluntary Support of America's Colleges and Universities, 1958-1959.* New York, The Council, 1959. p. 9.

TABLE 5.—Current-fund income of institutions of higher education, by control and source of income: 1957-58[1]

[Amounts in thousands]

Source	Public and private		Public		Private	
	Amount	Percent of total	Amount	Percent of total	Amount	Percent of total
TOTAL CURRENT-FUND INCOME	$4,675,513	100.0	$2,656,401	100.0	$2,019,112	100.0
Educational and general income	3,762,532	80.5	2,174,074	81.8	1,588,458	78.7
Tuition and fees from students	939,111	20.1	274,182	10.3	664,929	32.9
Federal Government	712,431	15.2	392,521	14.8	319,910	15.8
Veterans' tuition and fees[2]	5,056	.1	1,336	.1	3,720	.2
Land-grant institutions (regular appropriations)	83,937	1.8	82,295	3.1	1,642	.1
Research	534,389	11.4	232,775	8.8	301,613	14.9
Other purposes	89,049	1.9	76,114	2.9	12,935	.6
State governments	1,156,537	24.7	1,128,894	42.5	27,643	1.4
Local governments	129,389	2.8	125,843	4.7	3,546	.2
Endowment earnings	181,638	3.9	15,881	.6	165,757	8.2
Private gifts and grants	324,971	7.0	68,774	2.6	256,197	12.7
Related activities	199,303	4.3	108,400	4.1	90,903	4.5
Sales and services	47,448	1.0	30,864	1.2	16,584	.8
Other sources	71,705	1.5	28,716	1.1	42,989	2.1
Auxiliary enterprises	841,539	18.0	448,989	16.9	392,550	19.4
Student aid income	71,442	1.5	33,338	1.3	38,104	1.9

[1] Data are for aggregate United States—50 States and the outlying parts.

[2] Includes tuition and fees for World War II and disabled veterans only. Excludes tuition and fees for Korean veterans enrolled under Public Law 550.

SOURCE: Preliminary data compiled for *Statistics of Higher Education, 1957-58,* Biennial Survey of Education in the United States, 1956-58, U.S. Department of Health, Education, and Welfare, Office of Education.

PUBLIC-PRIVATE COMPETITION FOR CORPORATE FUNDS

Each crop of new entrants at our institutions of higher education greatly enlarges the needs of these institutions, and the amount of funds required to finance these needs. The facts of the financial problem of higher education and of mounting enrollments are as commonplace as is the concern that the lack of support may prevent colleges and universities from meeting their responsibilities to industry and to the Nation.

Private institutions of higher education have been plagued by practical limitations on tuition charges and by the overall inadequacy of alumni support and of private gifts, large as they may be. Public institutions have borne the brunt of the student population explosion and the increasing competition for State funds required by programs for mental health, welfare, and highways, and by local communities' demands for increased State aid to relieve the burden of local school costs.

A striking characteristic of higher education today is competition—competition for students, faculty, and money, and competition in curriculum offerings and public service programs designed to achieve excellence in teaching, stature, and influence. Such competition has been instrumental in raising faculty salaries, attracting more able young people to the academic world, increasing the quantity and quality of the college student population, and expanding the public service functions of our colleges and universities at home and abroad.

This competition has generally been on a school-to-school basis, except in financing. In fundraising, it has been natural for the schools to split into two groups, private and public. Public institutions have traditionally received the bulk of their support from State funds, while private institutions have relied on tuition charges, alumni support, and gifts from wealthy individuals, corporations, and foundations.

As the need for funds has increased, public and private institutions have invaded each other's financial preserves. Private institutions have turned increasingly to governmental sources of revenue. Aid from State and local sources has been limited for the most part to traditional exemptions from property taxes—exemptions that have been expanded in some States to include exemptions from other taxes—on business enterprises owned wholly or partly by educational institutions. At the Federal level, private schools have broken new ground by participating equally or more fully than previously in most Federal programs for grants, research, and other aids for higher education. The latest available data indicate that private institutions actually receive a larger proportion of their total incomes from the Federal Government than do public institutions, 15.8 percent versus 14.8 percent (table 5). If appropriations to land grant colleges are removed from the totals, private institutions are well ahead of public ones with 15.7 percent versus 11.7 percent. Equal consideration has been given to public and private institutions in awarding student scholarships, fellowships, and loans, including loans for dormitories; research grants made by the National Science Foundation, the National Institutes of Health, and the Office of Education; the various oversea programs; and the current efforts to expand programs for facilities and student aids. Federal funds for research comprise the largest part of the Federal outlay for higher education.

Public institutions, on the other hand, have called on the major corporations and foundations for support. They have argued that they are unable to attain their greatest usefulness or match the excellence of the best private colleges without supplementing their public appropriations from private sources.

It would be easy to exaggerate the conflict for funds between public and private institutions. In some States, such as Indiana and Ohio, amicable arrangements have been worked out by the presidents of the various institutions whereby the private institutions are given exclusive opportunities for solicitation of corporate support in the State, and they in turn either assist in justifying budget requests of public institutions or at least give tacit support.

Nevertheless the scramble for funds from every available source is raising what might be called jurisdictional problems, mainly in the area of corporate and foundation giving. The States are not likely to contribute significant sums for the support of private institutions, except possibly through aid to students. Whatever expansion of Federal programs or Federal support occurs will probably continue on an across-the-board public-private basis. Both groups are expected to look to corporation and foundation support with increasing competitiveness, however.

METHODS OF DISTRIBUTING FUNDS

As corporate and foundation grants become larger and competition for them intensifies, the basic question of "who gets what" will require a reevaluation of present practices.

Harry W. Smith, executive secretary of the Westinghouse Electric Fund, summarized the situation in 1956 when he said:

> The case for some corporate assumption of social responsibility for college and university needs is now so clearly established that current concern may

> be shifted to discovering best methods. A major unsolved consideration is, of course, how much of our historically successful dual system of private and public education is to be paid for privately.[4]

Corporations and foundations have responded in a variety of ways to requests for funds to support higher education. Some selectivity with regard to recipients has been inevitable. A common selection criterion has been proximity of the institution to corporate plant and office locations. Corporations also seem to favor the institutions their employees attended. Increasingly they are making large grants to fundraising associations of private colleges.

The proximity criterion has several advantages. It is not difficult to define; it gives rise to favorable local relations; and it allows small, poor schools to receive aid that they might not otherwise obtain. Yet many corporations appear to be searching for other criteria, especially as contribution budgets increase.

Contributing to the schools that employees had attended affords a satisfactory rationale for the selections. It can be presumed that a successful corporation is receiving benefits from the college training received by its employees, and the system is an obvious aid to employee morale. Some corporations, such as General Electric, match employee donations to their alma maters; some, such as General Motors, because of its large number of college-trained employees, contribute to schools of which a specified minimum number of employees are graduates. Others, such as the Columbia Broadcasting System, contribute only to the alma maters of a select group of key executives.[5] Administratively, one of the built-in virtues of this general technique is that in most instances the selectivity criteria are either automatic or generally acceptable and self-limiting.

Foundation grants for special research and corporate grants of a similar nature, which would be of particular benefit to the donating corporation, have raised no comparable problems of allocation. Such grants usually go to persons selected on the basis of special competence or to schools having adequate staff and facilities and a willingness to undertake special research.

Broader grants for scholarships, fellowships, faculty salaries, general research projects, or other general purposes have raised problems of selection. Typically, private giving to private institutions has been favored as a way to preserve a balance between privately and publicly supported institutions. The largest of such grants was the multimillion-dollar Ford Foundation grant of 1956 for faculty salaries, which excluded public institutions of higher education even though many public institutions had lower salary scales than similar private institutions. The presumption obviously was that public institutions could get equivalent salary money from their State legislatures.

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[4] National Industrial Conference Board. *The Why and How of Corporate Giving.* New York, The Board, 1956. p. 26.

[5] Ford's program, begun in 1960, matches employees' gifts to any university or high school up to $5,000.

Similarly the major program initiated by the Ford Foundation in 1960 with a grant of $46 million to five specially selected universities was, according to foundation president Henry T. Heald, part of a special program to consist of large, unrestricted grants to a few privately supported universities. Announcing the grant, Mr. Heald said: "It is essential to the welfare of the Nation that each part of its traditional dual system of higher education—the privately and publicly supported colleges and universities—remains strong and reaches higher levels of performance."[6] The total exclusion of public institutions from this program apparently presumes that public funds will always be adequate to enable public institutions to achieve their aims.

Many corporations have followed a similar pattern and have cut off support to public institutions. The Columbia Broadcasting System's Frank Stanton, announcing the corporation's original higher-education-support program, which limited aid to private schools, said:

> These institutions have a special problem which separates them from the tax-supported State and other public institutions. . . . But because of the different basis of support on which our privately endowed institutions depend, we are concentrating our contributions in this area. . . .[7]

Although General Motors scholarship plans are not limited to private institutions, its foundation program was conceived as exclusive assistance for such schools. A General Motors spokesman, explaining the company's decision, stated that—

> The public institutions can meet these costs through higher taxes. The private institutions, on the other hand, face a more difficult problem and have turned to the corporation as one source of additional support. We believe it is sound to provide such assistance and in this way aid in preserving the historic balance between enrollment in private colleges and universities and that in tax-supported institutions.[8]

The 1958-59 data of the Council of Financial Aid to Education are revealing in this regard. Excluding junior colleges, public institutions had about half of the enrollment of reporting institutions, but received only a fourth of corporate contributions. The comparison is even more dramatic between the major private and public institutions on a per pupil basis:

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[6] *Louisville Courier-Journal*, Sept. 25, 1960.

[7] National Industrial Conference Board, op. cit., p. 99.

[8] Ibid., p. 108.

TABLE 6.—High, median, and low of average gifts per student, 1958–59

Gifts per student	Major State institutions	Independent major private institutions	Major technological institutes
High	$35	$253	$499
Median	14	111	382
Low	6	42	72

Gifts from all sources show a similiar range among private and public institutions for the same year:

Type of school	*Average gift per student*
Professional and specialized	$875
Major private universities	768
Private men's colleges	595
Private coeducational institutions	453
Private women's colleges	444
State institutions	174
Municipal colleges and universities	138

If we look at institutions' financial accounts, we find that 29 percent of gifts and grants from corporations and business firms were received by public institutions in 1957–58, and 71 percent by private ones (table 3). These data include contract funds for research.

For some corporations the rationale of cutting off all support for public institutions has been: "We support you through our taxes." Other corporations have taken the middle ground. They continue to contribute to both private and public institutions of higher education, but reduce their grants to public institutions to compensate for their contributions to such institutions through State taxpayments. At least one major corporation has worked out a formula under which it makes such an allowance for State taxpayments when making grants to public institutions. Many, however, make no distinction between public and private institutions in their gift and grant programs.

What is clear about this situation is that no one has adequately solved the problem of measuring the amount of support that corporations contribute to public institutions through their taxes. Is it more or less than their grants to private institutions? The corporations that contribute only to private institutions because they contribute to public institutions through their taxes obviously are not aware that of their *Federal* taxpayments which go to institutions of higher education, 15 percent are received by private institutions (see table 5). Similarly the corporations that contribute equally to all institutions of higher education are not aware that private institutions receive only 2.4 percent of all *State and local* appropriations for higher education. Even where a formula is used to make an allowance for taxpayments, there is no well-developed basis for measuring corporate taxpayments or the proportion of such payments that are received by public institutions; and at best the results would be applicable only to the corporation making the calculation.

As corporate grants grow, the fundamental question of allocation among public and private schools will assume greater importance in the financing of higher educational institutions. This would appear to justify a more detailed examination of the situation, as follows:

MEASURING TAX SUPPORT BY CORPORATIONS

As far as the Federal tax dollar is concerned, it is clear that there is little ground for a corporation's differentiation between public and private institutions of higher education in making private grants when all other factors and motivations are equal. Private institutions which have approximately half of the total enrollment in the United States, received a little less than half the total Federal grants to higher education in 1957-58, the latest year for which data are available. Since Federal tax laws are uniform throughout the United States, whatever proportion of the corporate tax dollar goes to higher education is shared by public and private institutions. In this sense, public and private institutions as a whole are in equal need of income from private sources, corporate or otherwise, although there are important differences among individual institutions in both categories because the largest universities receive the bulk of Federal moneys.

The distribution of the tax dollar at the State level is in sharp contrast to that at the Federal level. Only 2.4 percent of all State and local public appropriations for higher education are received by private institutions. It is at this level that it will be fruitful to explore the problems of differences in corporate tax support of public and private institutions.

State corporate taxes are not uniform; nor are State appropriations for higher education. Corporate tax burdens vary by State, and the proportion of corporate tax dollars received by each State's public institutions also varies. It is therefore necessary to compile data in each of the 50 States in order to pinpoint whatever differential exists in public and private support.

The answer to the limited question of corporate tax support of public colleges and universities involves three basic sets of data in each State. First, we must know how much tax money was received by each public institution of higher education in a given period. Secondly, we must calculate the total pool of tax money. This information enables us to determine the percentage of tax money the institution received, which can be used as a basis for measuring the extent of public support for the institution. Thirdly, we must determine how much of the total tax pool was collected from corporations.

This is the raw data for computing the corporations' proportionate burden of the State's tax collections. From these data it is easy to calculate how much all the corporations subject to the State's taxes have contributed to the support of each public institution of higher education in that State. At that point we shall know what percentage of each corporate tax dollar in the State goes to higher education. With this information, a particular corporation can calculate its own tax contribution to higher education in the future.

The gathering of these data is beset with many pitfalls. Problems of definition, methodology, and availability of reliable data abound. And complications arise from different accounting procedures and from variations in State tax systems. Some approaches to a workable solution to the overall problem may be suggested here.

When we speak of higher education in this context, we mean the academic activities of institutions of higher learning, not their "outside" or commercial ventures. In some colleges this implies instructional activities only, but major universities today have three recognized academic functions—instruction, research, and public service. These functions are carried out not only through student instruction and other faculty activities, but also through agricultural experiment stations, agricultural extension services, hospitals associated with medical schools or devoted to the treatment of students or staff, speech and hearing clinics, extension centers (including courses for college credit and those not for credit), athletic plants, dormitories, faculty housing, bookstores, student unions, laboratories, and research facilities of all kinds. Noneducational commercial enterprises of any kind would obviously not be academic functions even though they are administered by the institution, but they may be important revenue producers.

AMOUNT OF TAX SUPPORT

The annual State appropriation cannot be considered equivalent to the amount of State taxes spent for higher education. In some States, by constitution or by statute, all moneys including tuition received by public educational institutions must be deposited in the State treasury, whereupon they are usually appropriated back to the institution by legislative act. To get a meaningful and comparable figure for each State, we calculate the net legislative appropriation by subtracting the amount of the appropriations for all nonacademic functions and of any nontax income received by the school which has been deposited in the State treasury and appropriated for the institution. Hence, if any of these activities are partially supported out of tax revenues, that part—and only that part—is chargeable to the taxpayers.

We are not out of the woods yet. States often finance educational activities out of bond revenues. These are not tax revenues, except when tax moneys are used to pay interest or principal on such bonds. On the other hand, public welfare moneys paid to university-operated hospitals for handling charity cases are in effect taxpayments in support of one of the university's academic functions.

A special problem arises for capital appropriations. In most States such appropriations are made only as urgent needs arise. To make a fair test of tax support of higher education, an average figure of capital appropriations over an extended period of from 4 to 10 years may be necessary.

SOURCES OF TAX SUPPORT

It is relatively easy to determine how much tax support a public institution of higher education receives. It is more difficult, and more crucial, to define the total pool of tax revenues out of which appropriations for higher education are made. The three components of this problem are: (a) the separation of public revenues into tax and nontax categories; (b) the distinction, if any, between general-purpose taxes and taxes levied for regulatory purposes or special uses; and (c) the inclusion or exclusion of local tax revenues.

We can easily set apart from other revenues intergovernmental receipts and receipts from State-owned or locally owned public facilities. Also not classifiable as taxes are fees received in the operation of medical facilities, toll roads, utilities, garbage and sewer systems, and commercial enterprises, such as liquor stores, as well as insurance trust receipts (including teachers' and State employees' pension funds), interest, and miscellaneous receipts from fines and the like.

A more vexing problem emerges after tax revenues are properly defined. Some taxes are obviously imposed for general revenue purposes; others, such as gasoline taxes, may be imposed for special purposes benefiting the taxpayers and the revenues put into dedicated or earmarked funds; still others, such as professional and business license fees and severance taxes, may be levied in token amounts and designed specifically for regulatory purposes.

When the State imposes a levy on a particular group of persons for the exclusive benefit of that group, or in the public interest as a regulatory measure, there is justification for treating such revenues separately from the general pool of State moneys available for education and other general purposes, just as it is necessary to exclude from the pool of public funds tuition fees paid by students, even though such fees a[illegible]art of the funds available to institutions of higher education [illegible]es are used for the exclusive and direct benefit of the payees just as motor vehicle taxes are used to build highways for motor vehicle taxpayers.

Care must be exercised in dealing with this problem. It is one thing to exclude severance taxes on oil when they are used exclusively to control the rate of production of oil and gas, and it is another to exclude such revenues when they are used wholly or partly for education or other general purposes. The rule would be, then, that to the extent that tax revenues or fees are classifiable as user taxes or regulatory taxes, they are not part of the revenue pool out of which public institutions of higher education derive tax support; to the extent that such revenues are used for other purposes, they would have to be considered as part of the total revenue pool, even though earmarked.

Hence all sources of general revenue such as property, sales, income, and transfer taxes would be part of the revenue pool, except where, as in the case of motor fuel taxes dedicated for highway purposes or alcoholic beverage taxes used for control of the alcoholic beverage industry, they would come under the exclusionary rule explained above. The same would apply to special business taxes, such as franchise, privilege, and occupation taxes, and to miscellaneous taxes, such as poll, parimutuel, and admission taxes.

Usually when we refer to State taxes we mean just that—taxes imposed and collected by the State. Since almost all regular appropriations for public institutions of higher learning are made by the State, the total pool of taxes as defined above could be expected to be limited to revenue from State taxes. Yet even the most superficial analysis of State tax structures reveals that States differ widely not only in the proportions of taxes collected at the State and the local level but also in the amount of State aid given to local communities and in the dependence upon business taxes to support State and local functions. In Indiana, for example, many corporations pay extremely light State taxes and heavy local property taxes. In West Virginia, the State taxes are much heavier and the local taxes lighter. In Nebraska and California the total burden is likely to be more evenly balanced. Where State aid to local communities is extensive, the proportion of State taxes to local is high; and where State aid is minimal, the State tax burden is comparatively light. In States where local functions are locally financed, the total of State taxes will be materially lessened and the appropriation for public institutions of higher learning will amount to a larger proportion of State tax revenues than it does in States where a major proportion of local functions are financed by State aid. Under the latter conditions most taxes will be levied by the State; and the appropriation for higher education, even though the same as in the first instance, would appear to amount to a much smaller proportion of the total tax pool.

For all of these reasons no valid or consistent data can be derived unless the amount of a State's total tax pool is calculated by including both State and local taxes. This does not amount to a paper reduction in corporation support for higher education because corporate taxpayments to State and local governments will necessarily be included in the total of corporate taxpayments, from which their tax support of higher education is credited.

TAXES PAID BY CORPORATIONS

Having determined the amount of tax support of an institution in a State and the tax sources available for this support, we still must seek an answer to "How much is paid by corporations?" On the surface it would appear that corporate taxes are easily distinguishable from noncorporate taxes. The corporation income tax and the personal income tax are obvious examples. But does the corporation ultimately pay the corporation income tax? The economist will argue that such taxes are ultimately borne by the shareholder through reduced dividends or are shifted to the consumer through increased prices, or to the employee through reduced wages. This problem need not concern us here because whatever the ultimate incidence of corporation taxpayments, the same incidence would apply to corporate contributions to private institutions of higher education.

If we limit our analysis to initial tax payments, we need only determine: (*a*) which tax payments are drawn from funds from which the corporation contributes also to private institutions, and (*b*) which payments are made by corporations while serving only as collection agencies for taxes imposed directly on individuals and other consumers.

The collection-agency criterion is a simple one from a legal point of view because the law, in virtually every case, will specify whether a business entity is serving as a collection agency. Whenever the legal liability for the tax is on the consumer (as in some sales, use, excise, and gross-receipts taxes) or on the income earner (as in withheld taxes), such taxes would not be counted as taxpayments by the corporation, although the corporation may be required to collect the tax and turn the money over to the State. But sales and excise taxes paid by corporations as consumers of taxable goods would be treated as corporation taxes.

Legal liability should not be the only criterion for determining who directly pays a specific tax. The legal liability of a sales tax may, for example, rest upon the retailer primarily for administrative convenience. If, however, the law allows the retailer to collect the tax from the consumer, and retailers *generally* do so, that tax should be considered a direct tax on consumers. For determining tax payments attributable to consumers or income earners, other criteria would be (*a*) the allowances to business firms for collection, and (*b*) eligibility for tax refunds or for tax deductions.

In general, sales, use, and excise taxes as well as withheld income taxes would be allocated to consumers and income earners. Manufacturers' excise taxes, payment of which is a legal obligation of the manufacturer unless there are mandatory provisions in the law for shifting them, would be attributed to business firms. Gross-receipts, business activities, value added, gross-margin, and insurance gross premium taxes would be counted as business taxes except where the law explicitly requires or allows shifting of the tax to the consumer. Utility gross receipts can be assumed to be consumer taxes without regard to the legal obligation to pay because of the special circumstances of rate fixing.

Even if these concepts and definitions provide an adequate and satisfactory basis for determining the extent of corporate tax support of public institutions of higher education, there remains the question of the availability of required data in State and local records. As far as is known, no State segregates taxpayments by corporations with regard to all State and local taxes. Data on taxes that are paid exclusively by corporations can be readily obtained from official reports in most States. On taxes paid by corporations and noncorporate taxpayers, corporate payments must be segregated and totaled. On taxes paid directly to the State, it is possible to examine administrative records to make this breakdown.

Local taxes, especially the property tax, present formidable problems, because property taxes on corporations are not separately recorded and administration is usually decentralized. Sampling procedures would normally have to be used.

These are the major considerations in calculating the amount of corporate tax support for public institutions of higher education. A rundown of the situation in one State A will perhaps give a clearer picture of the recommended technique.[9]

Total revenue of State and local governments in State A in 1959 was $1,137 million, of which $106 million was intergovernmental revenue from the Federal Government and $213 million, nontax receipts, making total State and local tax revenues $818 million, as follows:

Item	*Amount (millions)*	*Item*	*Amount (millions)*
General property	$414	Employment security	$27
Income	170	Inheritance and gift	12
Motor vehicle	111	Insurance	8
Excises	35	Occupations and licensing	6
Public utility	35		

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[9] The following data are preliminary figures in one State from a pilot study of revenue in five States in which the author is currently engaged. The States will be identified when the final report is made.

Motor vehicle, employment security, and all but one half million of the occupations and license taxes are classified as user or regulatory taxes as defined previously. Hence the State and local total tax pool out of which the State university received its appropriation that year was almost $675 million.

Surveys of tax records revealed that corporations paid $100 million in property taxes, $18 million in income taxes, $26 million in utility property taxes, and $8 million in insurance taxes for a total of $182 million, or slightly over a fourth of the State and local tax pool.

The net appropriation from State and local governments to the State university for academic purposes (operating and capital) amounted to $28 million—about 4 percent of the total revenue available for general State and local purposes. The university therefore received the equivalent of about $7 million from corporate taxpayers in the State. Furthermore, 4 cents out of each corporate tax dollar was allocated to the support of the university.

Each corporation paying taxes into the total tax pool in State A could easily calculate its contribution to the university by multiplying its total taxpayments by 4 percent, being careful first to deduct motor vehicle, employment security, and occupational taxes from its total tax bill. Similar calculations could be made for each public and private institution of higher education receiving appropriations from State and local governmental sources.

These data could be combined with known information about voluntary corporate and governmental support of public and private institutions and about enrollment, out of which meaningful comparisons could be made by educators, public officials, and corporate and foundation officers in planning for equitable financing of institutions of higher education in the United States. To be useful on so broad a scale, it would be necessary to calculate corporate tax support in every State or at the very least in a representative sample of States, and the results would have to be revised whenever significant changes were made in State and local tax burdens.

VOLUNTARY CONTRIBUTIONS OF CORPORATIONS

This chapter has left unanswered the question of how much corporations should contribute to higher education. We have emphasized the problem of how corporations should allocate contributions because the record indicates that corporate support is quite low in relation to other sources of voluntary support, and that corporate benefits from institutions of higher education will continue to increase rapidly. As corporate contributions increase, need for a solution to the problem of equitable allocation of support among institutions of higher education will become more urgent.

CHAPTER 16

A Proposal for Student Loans

William Vickrey[*]

IT IS ONE of the most striking failings of the affluent society that it seems to be unable to find a way to finance to anywhere near its potential economic limits the most productive investment opportunity open to it: the education of its people to the full extent of their capabilities. Expansion of State universities with no or low tuition fees, though a large step, is not the complete answer: It fails to meet the needs of students whose families cannot afford to provide them with the complementary support in terms of board, lodging, books, and other supplies. It fails, also, to strengthen our private colleges and universities, whose role is so vital to educational achievements in the United States.

The classical individualistic economic answer to this problem would be to arrange for loans to individuals who show such promise that it is reasonably certain that investment in their further education would be an investment capable of yielding at least the normal rate of return on comparably risky investment.[1] The present chapter is designed to outline a proposal that follows through on the major premises of this classical economic answer. While this proposal is here developed in some detail, it is not suggested as an exclusive solution to the problem of financing higher education. Rather it is a scheme which, if implemented, would supplement other institutional arrangements for such financing. While the more familiar sources of support for institutions of higher education need to be expanded, and aid to students greatly enlarged, there is also need for new financial arrangements to facilitate the flow of capital into development of human resources through education.

The trouble with student loans in the past has been that students have on the whole been understandably reluctant to saddle themselves with a fixed repayment obligation, and to a lesser extent that potential lenders have been reluctant to make investments where the risk is so highly variable and subjective and where arrangements for enforcing claims for repayment over a long period of years are so tedious and potentially costly. The fact that many of our larger universities find that student loan funds are under very light pressure, if indeed they are not in some instances going begging, indicates that something is wrong with the terms on which these loans are being made available.

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[*] *Professor of economics, Columbia University.*

[1] Milton Friedman, "The Role of Government in Education," *in* Robert A. Solo, ed., *Economics and the Public Interest*. New Brunswick, N.J., Rutgers University Press, 1955. p. 135–143.

The main difficulty seems to be the fear that the obligation of repayment might under some circumstances prove a severe burden.[4] Though on the average it can be shown that the student's additional earning power that is generated by better education can by itself take care of this added burden with a wide margin, individual students may have a legitimate fear that they will not come up to this average. Furthermore, while the pressure for repayment tends to be minimal, many of the potential beneficiaries of such loans feel that the burden of repayment might possibly become a heavy weight on their shoulders which they could not conscientiously repudiate. To be sure, there is sometimes specific provision for remission of the debt if the beneficiary enters the ministry, or teaching, or some similar line of public service that carries a relatively low salary. But the line between such public service and other less specific lines of low paid service is difficult to draw. The funds available on such terms are fairly limited in any case; and the mere offering of such funds would hardly meet the problem even if unlimited funds could be obtained for loans with special remission provisions.

Another difficulty is that such funds are still provided largely in an atmosphere of philanthropy rather than of financial investment. Subsidized interest rates tend, on the one hand, to limit the availability of the funds, and on the other, to fix the charity stigma the more firmly.

A third factor, stemming from the first two, is that such loan funds are rather severely rationed, both as to the level of scholarship achievement required for eligibility and as to the amount to be supplied to any one person. Where the burden of repayment can become substantial, it is natural to protect the applicant from getting in too deep; where there is an element of subsidy in the loan, the worthiness of the applicant becomes a consideration. In many cases the amount potentially available is inadequate to meet the needs of a student under heavy pressure to begin earning to meet family obligations.

In spite of this equivocal experience, given the high profitability of investment in education both to the individual and to the community, it should be possible, by a combination of the techniques of mutual investment, the limited-dividend corporation, pension funds, and income taxation to provide whatever funds are needed to finance education up to the point where the marginal returns are comparable with those from other forms of investment. With ingenuity, arrangements can be devised that will promise reasonable returns and security to the investor, while at the same time offering the student terms that he can accept as readily as he mortgages his house or borrows to buy an automobile.

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[4] See Richard Eckaus, ch. 8 of this publication, for mention of assessments of the risk of borrowing by different income groups and in different regions.

ESSENTIALS OF THE PROPOSAL

In brief, it is suggested that funds for the financing of the student's education be made available in liberal amounts in return for an agreement to return dividends, computed as a share of later earnings according to the concepts of income taxation. The exemptions and the rate scale of the dividend repayments should be so arranged that the dividend with respect to the amount advanced at any stage of educational advancement would come out of that portion of his income above the level of earnings that would be expected if education had stopped at that point. For example, for loans taken out to finance the freshman and sophomore years, the return dividend could be computed as a share of income after an exemption of, say, $4,000—this exemption being determined to reflect the average level of earnings to be expected by a student who is intellectually eligible for college but who goes no further than high school. At the other extreme, funds advanced to pay for a third year of graduate training might call for a dividend share to begin only after an exemption of $8,000. In this way the typical student who is on the verge of stopping his education for financial reasons can continue it with very little financial risk. Even if the educational investment fails to enhance his earning power, he will be no worse off than before.

The principal exception to this would be a type of student who sees himself earning, say, $30,000 a year through his native genius even if he goes no further than high school, but takes such a dim view of the value of a college education that he believes it would boost his earnings only to $32,000. In this case, if he were to finance his education in a manner that entailed the payment of a dividend of, say, 12 percent of $20,000, he would be financially worse off than if he had not pursued his education beyond high school, whereas even in this case the investment would have paid off adequately from a social point of view. Situations of this sort should be rare enough not to constitute a serious problem.

One of the main difficulties with any such plan for student loans is, of course, that the projection for 40 years or more into the future of the relation between education and earnings is so uncertain that it would be impossible to determine in advance a system of earnings-dividend rates that would return any specified yield on the investment.

Yet it is necessary to achieve at least some minimum yield in order to preserve from undue impairment any endowment funds that might be diverted to this form of investment and possibly also to obtain additional outside funds on a competitive basis from lenders of various types. Too high a return, however, either as an "ex post" experience or as an expectation, warranted or unwarranted, might give rise to a feeling that the student borrowers were being unduly exploited.

APPLICATION OF MUTUAL-FUND PRINCIPLE

The problem of assuring a net yield that is fair but not excessive can be met by adapting the mutual fund principle, in a form slightly different from that used by cooperatives and mutual investment funds. The earnings-dividend schedules could be initially so set as to yield, on conservative assumptions, a yield of at least 6 percent, and possibly as much as 8 or 10 percent. The higher rates would be desirable at least in part as a means of providing for the growth of the scheme through internal accumulation, as well as making it possible to attract outside capital on a reasonably low-interest basis. Subsequently, as experience makes it possible to evaluate the equities of the various participants in the scheme somewhat more closely, it would be possible to adjust matters by the payment of "patronage dividends" or the downward adjustment of the earnings-dividend rates in such a manner as to reduce the net yield to whatever figure is deemed reasonable. This figure and even the procedure by which it is to be reached could be specified, if desired, in original contracts.

Even here, the divergent aims of lowering the net eventual cost to the students and at the same time accumulating capital funds for expansion can to a considerable extent be reconciled by deferring the payment of these patronage refunds as long as possible. Indeed, an appropriate form of refund would be in the form of a death benefit or a retirement annuity. Then, in effect, if the net yield aimed at were set somewhat high for the sake of rapid expansion from internal funds, this would be less of an inequity. While students on the average would be required to pay fairly high rates of interest on their loans, they would later be compensated by being able to invest in their turn in the education of succeeding generations at similarly high rates of interest so as to obtain their annuities at relatively low cost.

COORDINATION WITH INCOME TAXES

The fact that the repayment takes the form of a share of income above an exemption raises the problem of the relation of such repayments on earnings-dividends to Federal and other income taxes. It would be at least awkward if the combined rates got up near 100 percent for any substantial number of persons. The simplest remedy, and one that should prove readily acceptable, would be to make the earnings-dividends a deduction in computing net income for tax purposes. To the extent that this might be considered to constitute a breach of the basic principles of income taxation, it could well be justified on the basis of the benefits derived by the community at large from a rise in the educational level of individuals.

Actually even the strictest interpretation of the situation would call merely for considering the original payments to the student as taxable income to him at that time, presumably taxed at lower bracket rates. Subsequent earnings-dividend payments would then clearly be completely deductible. The analogous situation would be that of an artisan who borrows money to pay himself a salary to construct an income-earning asset. Interest and amortization payments on this loan would then be deductible, either directly or as amortization or depreciation of the cost of the asset over its life. However, it would be proper to exclude from the student's taxable income the payments going to defray tuition and other expenses that are clearly for training and similar enhancement of earning power. Such exclusion would not apply to educational costs undertaken for current satisfaction or future cultural enrichment unrelated to earning power. This is analogous to the exclusion from the artisan's income of the part of the proceeds of his loan that is used to pay assistants or buy materials rather than for his own living expenses. It is clearly difficult to draw any sharp line between technical training and cultural enrichment. Here again the general public interest in cultural enrichment would probably justify a policy of excluding all tuition payments and similar fees from the student's taxable income, by allowing them to be deducted where appropriate. Whatever is done would in any case be coordinated with the tax treatment of educational outlays financed by the student or his family. The principles involved here are closely related to those set forth by Richard Goode in chapter 17 of this publication.

One could go further than this and exclude from the income of the student even amounts advanced for living expenses. This would indeed have the advantage of making whatever funds are initially available go farther. However, such a treatment would raise the question of the degree to which subsequent earnings-dividend payments would properly be deductible. To make them fully deductible would clearly be something of a breach with the basic concepts of the tax. A satisfactory solution would be to allow deduction each year only for earnings-dividends exceeding, say, 10 percent of the aggregate amount advanced tax free for living expenses. When the nondeductible earnings-dividends have aggregated 110 percent of the total tax-free advance for living expenses, all earnings-dividends thereafter would be deductible. The use of 110 percent rather than 100 percent is to allow for the fact that in some individual cases the earnings dividends will fall short of the advance. The figure is intended to insure that for the group as a whole, the aggregate amount included in taxable income is approximately correct and that there would thus be no "ex ante" expectation of ultimate tax avoidance through the use of the plan.

There is also the possibility of deferring the payment of tax from the student years to later years. In general, this will shift income from the low brackets of the student years to the higher brackets of the later years. The computations involved in a procedure such as this should be no obstacle, as these can easily be taken care of by the agency to which the dividends are to be paid.

Some question may well be raised as to whether it is the entire later life income that should be made the basis for the earnings-dividends, or merely the earned income. Although again there would seem to be no grounds for requiring higher repayments from a student who receives a large inheritance subsequent to his graduation than from one who does not, there is good reason for including unearned income in the case of the individual whose income comes through stock options or similar quasi-earnings, or who acquires a fortune by stock-market trading, using skills acquired in business school. In practice the two types of case would be difficult to distinguish sharply. On full examination the argument for the more inclusive base seems compelling. There are, of course, other problems relating to the treatment of family incomes for this purpose, but such details need not detain us in this preliminary discussion.

Enforcement should not be too difficult. A condition of the original advance would presumably be an agreement to provide on request copies of Federal income tax returns, with stipulations that such information would be confidential. It might be necessary to limit the scheme to citizens of the United States. Even so limited, it would be a benefit to foreign students in that it would permit more of the outright scholarship funds and other student aid funds to go to students not eligible for advances under this plan.

IMPACT ON FINANCING

The amounts available as advances under this plan should be as liberal as the available financial support permits. Ideally it should extend to sums intended to cover not only the ordinary costs of tuition and books but also, in cases where even minimal evidence of such need can be shown, amounts needed as a substitute for the earnings that the student is foregoing to meet obligations for family support or other necessities. A student should be enabled to complete his education to the limit of his abilities without financial hardship. Ideally this would mean being prepared to advance to a student amounts ranging up to $1,000 for a freshman year, and scaling up to $8,000 for a third year of graduate study.

Unfortunately, few if any colleges possess endowment funds sufficient to meet the potential demand on a scale such as this, even if the institutional and testamentary obstacles to the diversion of funds to such use can be overcome. Conceivably a university might be able to borrow in the financial markets on the security of the earnings-dividend contracts that it would enter into, or perhaps arrange for the setting up of an auxiliary limited profit corporation to do this. The novelty of the proposal, however, may make it extremely difficult to finance it adequately on reasonable terms unless more substantial backing is given to it than can be supplied by most individual colleges or universities. Somewhat more promising might be the setting up of one or more "educational finance corporations" sponsored jointly by groups of colleges and universities.

It is rather hard to say just what the schedule of earnings-dividends for the various types and amounts of advances should be and how the insurance or pension benefits should be arranged. It is possible, nevertheless, to indicate some of the general principles that it would be desirable to follow. It is of course important that, when considered in relation to associated pension and other benefits, the repayment terms not be so onerous as to appear unattractive to potential students. On the other hand, the schedule should provide adequate security for the suppliers of the original funds, even in the face of considerable initial uncertainty as to the magnitude and distribution of the income base to which the schedule would apply. In addition, it would be desirable that the derived funds provide scope for a substantial amount of internal financing of growth in the magnitude of the operation. To a considerable extent these objectives can be met by borrowing from the insurance field two well-established features: rating and mutuality.

MINIMIZING ADVERSE SELECTION

As with any risk-pooling plan, in the absence of risk rating there would be a tendency for a certain adverse selection of risks to develop. Applications would tend to run heavier from students who felt their future income prospects to be below average for their level of education and who, in anticipation of future repayments based on comparatively low incomes, considered the advances a bargain. Conversely, students with great confidence in their own economic future would tend to minimize their use of the plan, stretching their own resources to the limit, possibly to the detriment of their studies, to avoid any large share in making up the deficits produced by the less successful students. A cumulative adverse selection of risks might so burden the plan with mediocre students that it would be attractive to the better students only as a last resort.

The more liberal the amounts available, the more serious the tendency toward adverse selection would be. Even among students who did use the plan, there would be a possibility of wide variation in the amounts applied for and advanced, and thus for adverse selection of amounts, as well as of students. The amounts advanced can be limited administratively to estimated needs in individual cases, unless the administrative standards are so stringent as to discourage some students from continuing a potentially profitable course of study. The standards would have to be flexible, rather than specific, so that considerable range would remain for individual choice. In any case, imposition of any such standard of need would infringe on what is intended to be a basic philosophy of this proposal, namely, that funds should ultimately be available on a sufficiently ample scale so that each student could be left free to determine for himself the amount of the advance that he wishes to apply for, up to an amount equal to the sum of his tuition fees and his estimated current earning capacity.[3]

While adverse selection of risks can seldom be eliminated entirely in a voluntary risk-sharing scheme, rating of risks usually can reduce its scope. If the rating process is an effective one, this can be done to the point where adverse selection is no longer a serious problem. The mutuality elements of the scheme can also be made to contribute to the minimization of adverse risks if the "ex post" adjustments are made in a way which reflects individual experience. But as long as there is an important risk-sharing element, the rating of risks must bear the major burden of guarding against excessive adverse selection.

In the case of student loans, we have available a readymade basis for risk rating in the form of grades, test scores, and other evidence of educational potential. At the time of application for an advance (t_a), the applicant might be assigned a rating in terms of which an estimate could be made of the expected earnings $E(t)$ at each future time t that the applicant might obtain if he terminates his education immediately, and also of the expected earnings potential $P(t)$ that the applicant might obtain at each future time t if he completed his education to the full extent of his currently apparent potential. The student would then be offered a contract under which he might obtain an advance with respect to the forthcoming school year of any amount he chooses up to a maximum equal to the sum of his tuition fees and the amount $E(t_0)$ that he could be expected to earn currently if he terminates his education. The contract would then specify that the corresponding future earnings dividend to be paid back at time t would be computed on the basis of an exemption equal to $E(t)$, with mildly progressive rates applied to income in excess of this exemption, such that if the future income is actually $I(t)$, the earnings-dividends will, over the lifetime of the student, amount to, say, a 9-percent rate of return on the amount of the advance.

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[3] Kingman Brewster, Jr., in the June 1961 *Yale Alumni Magazine* (p. 13–14), advances a proposal for student loans very similar to this one. He, however, would limit loans to amounts sufficient to cover all students expenses *except tuition*. He excludes tuition costs because

> . . . it is probably impossible to draw up a loan or grants scheme which would subsidize the payment of tuition without driving a very harmful wedge between our public and private institutions. That is why I would limit the subsidy to what can be roughly calculated as the costs of higher education—*excluding tuition*.

Each succeeding year a new contract could be made available, based on the rating provided by the further record made by the student, with a new exemption level and schedule of rates dependent on the amount of loan requested. In this way at each stage the student who shows any promise of being able to benefit adequately from further education would be offered a chance to finance this further education on a virtually "no cure, no pay" basis. The redistributive element in the scheme would be limited roughly to the unpredictable element in the variation of future incomes. On an "ex ante" basis, the applicants might well be brought to feel that the potential advantages of the plan are reasonably comparable for all concerned. Adverse selection would thus be limited to cases in which the student has a genuinely better basis for the appraisal of his prospects than that provided by the rating. The number of cases in which students have a superior basis of appraisal should not be sufficient to cause difficulty. At the same time a direct and tangible incentive for scholastic excellence would be provided, both as to the amount of advance available and as to the terms offered. This incentive would not be limited as it is at present to the students who are now prospects for scholarships, but would be extended to a major fraction of all students.[4]

It might be desirable to move somewhat cautiously in this direction lest more pressure be placed on the grading or rating system than it can stand. But if the plan is to remain voluntary and be liberal in scope, some degree of risk rating would seem to be essential to preserving its financial integrity. It might be necessary to borrow an element from the field of property taxation and have some form of grade equalization process among institutions or even among instructors. This equalization in turn might have its own salutary effects. But these are ramifications that would take us too far afield at this stage of consideration.

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[4] If this aspect of the proposal sounds a bit reminiscent of the practices of Upper Upanishad University, as reported by William R. Mueller, this is not entirely a random coincidence. See "Report from Upper Upanishad." *AAUP Bulletin*, American Association of University Professors, 43 : 477–483, September 1957.

MUTUALITY AND RETIREMENT BENEFITS

Of course, the 9 percent return aimed at in the setting of the earnings-dividend schedules would not represent the net cost of the advance to the student, by reason of the mutuality element in the scheme. Records would be kept of the total amounts advanced to, and the earnings-dividends returned by, various groups of student beneficiaries, and beyond a certain point further earnings-dividend payments would generate rights to retirement pensions. For example, amounts credited to the account of a given cohort of students could first be used to amortize the amount advanced by investors at 5 percent interest. When this amortization has been completed, further earnings-dividends could be divided in some specified proportions, say one-third for the account of investors and two thirds to a "cohort equity account" until such time as the payments to investors have become equivalent to an amortization at 7 percent interest, after which all further earnings-dividends would be credited to a cohort equity account. Amounts thus accumulated in the cohort equity account would then become available to be invested on behalf of this cohort in the making of advances to further generations of students. The older cohort thus assumes the role of investor vis-a-vis the younger cohorts of students, and the advances thus made would in their turn be capable of yielding up to 7 percent in favorable circumstances.

As the members of the original cohort reach retirement age, earnings would cease to be subject to the earnings-dividend payment, and the amount standing to the credit of cohort would become the basis for the payment of retirement benefits. If it is desired to keep the redistributive element of the scheme to a minimum, a step that would assist materially with the problem of adverse selection, these retirement benefits could be made proportional to the excess of each individual's earnings-dividend payments over the sum needed to amortize his advances at 7 percent. In this way a student who felt that his economic prospects were considerably brighter than his scholastic record indicated would then be able to feel free to make full use of the scheme, since even if his earnings-dividend payments turned out to be much larger relative to his advance than for the average student of his rating, he would in turn benefit through higher retirement payments.

If the numbers of student beneficiaries in some of the cohort or groups are too small to prevent significant random fluctuations among the experiences of different cohorts, it is desirable to provide for the fitting of smooth curves to the experience of the various cohorts, and for equalizing intercohort transfers to bring the funds into line with what would have obtained if each cohort had had an experience equivalent to that shown by the smooth curve. This is essentially no different in principle, but perhaps somewhat more complex in application, from the methods actually adopted for the determination of dividend schedules on mutual life insurance policies.

AMOUNTS OF LOANS AND REPAYMENTS

The possible variations on a plan such as this are, of course, manifold, and there is room here only to sketch out roughly some typical possibilities. As an example for a student of average capabilities, one might set the exemption level $E(t)$ for the freshman and sophomore years at an amount averaging about $4,000 a year over his working life, varying possibly from one period to another from perhaps $3,000 to $6,000. The exemption level might be raised for the junior year to an amount averaging $4,500; for the senior year to $[illegible],000; and for the subsequent 3 years of graduate work, to $6,000, $7,000, and $8,000. Then as a rough order of magnitude, for each $1,000 advanced during any particular year of study, the earnings-dividend rate might be 0.5 percent of the first $1,000 of income above the corresponding exemption level, 1.0 percent of the next $1,000 of income, and 1.5 percent on all income in excess of $E(t) + \$2{,}000$.

Such a schedule is at least of the right general order of magnitude. Miller estimates that the lifetime earnings of the average college graduate amount to $435,000 at 1958 earnings levels.[5] Taking account of advances in average earnings, a lifetime-earnings figure of at least $500,000 or an average of $12,500 a year over a working lifetime of 40 years seems reasonable for students graduating in 1963. On that basis if an average student were to borrow $2,000 to complete his senior year, he would be paying an earnings-dividend of $195 on an income of $12,500 ($10 on first $1,000 above the $5,000 exemption, $20 on the next $1,000, and $165 on the remaining $5,500, the rates being of course twice the rates for a $1,000 advance). After allowing for lower earnings during the early years, this should provide a gross rate of return of between 9 and 10 percent, so that after the amortization of the advance at 7 percent interest has been completed, there should be a substantial margin for the financing of retirement benefits through advances made to succeeding generations of students.

An average-rated student completing 4 years of college and drawing an advance of $2,000 for each of the 4 years, or a total of $8,000, would on this basis be contracting for an earnings-dividend payment of 2 percent on the first $500 of any income above $4,000 (in a year of average exemption level), of 3, 6, 7, 10, and 11 percent, respectively, on the succeeding $500 brackets, and 12 percent on all income above

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[5] *See* Herman P. Miller, chapter 9 of this publication; also Richard Goode, chapter 17.

$7,000; on an average income of $12,500, this would amount to $855. In an extreme case a student who went through 7 years of undergraduate and graduate training and contracted for the maximum advance obtainable would be receiving advances ranging from $1,000 for freshman year ($3,000 as a substitute for earnings forgone and $1,000 for tuition fees) to $8,000 for the third year of graduate work, a total of $38,500; in return for this he would be contracting for earnings-dividend payments on a scale ranging up to 57¾ percent on that part of his income in excess of $10,000 for the years in which his earnings are expected to reach their average annual lifetime level. The income level above which this rate would apply would be somewhat higher in the years of his peak earning power, and somewhat lower in the years before his full earning power is expected to be achieved. Also, for students showing the degree of promise typical of those for whom graduate study is usually considered warranted, the exemption level and the income brackets might tend to be somewhat higher than in this example, which applies to students of average scholastic rating. While this may even so seem at first glance to be a fairly stiff price to pay for an education, yet for students who have no other means of financing their education and whose immediate financial needs, whether arising from family obligations or other sources, are such as to make the completion of their education difficult or impossible without advances of this magnitude, even such a schedule should not be a prohibitive obstacle to the full use of the loan plan, particularly as the offer is practically on a "no cure, no pay" basis and is likely to provide as a byproduct a substantial amount of additional old age security. There is, of course, the possibility that the 54 percent dividend rate on the excess over $10,000 when combined with rates of the income tax proper would add up to a serious incentive problem at the higher earnings levels, even after allowing for the deductibility of the earnings-dividend in computing taxable income. But the number of cases in which this amount of financing would be required is likely to be small enough not to make this a serious problem. The example is useful chiefly as an illustration of the lengths to which educational finance on a liberal scale can profitably be pushed.

ULTIMATE SCOPE

If funds can be made available to students in adequate amounts on such a basis, then, of course, the way will be open to raising tuition fees to levels that will make it possible for faculty salaries to be raised to levels more nearly in line with earnings in other comparable occupations. (This would eventually make it possible for professors to make significant earnings-dividend payments on the cost of *their* education.) If the preservation of private and independent colleges and universities—a significant segment of our educational system—is important, as insurance against impairment of the spirit of free inquiry and as an element in the basic freedom of our culture, some such method of financing may well be an important means to this end. To continue to rely solely on private philanthropy, plus the paying of fees by students on their own, is likely to keep private education from fulfilling its proper role. Besides, such reliance places a heavy strain on philanthropic resources that can be used effectively in many other areas. Even if State support for private higher education can be arranged in a manner that will preserve the independence and specific character of these institutions, it seems doubtful whether the amount of such support actually forthcoming will prove sufficient and timely. Equity investment in education may well provide a major part of the solution to this problem.

But a plan such as this need not be limited to private universities and colleges, though this is perhaps the area of most intense need. The financing of nontuition expenses and of family maintenance requirements for students in State universities is an even greater problem in terms of the numbers and amounts that could eventually be involved. Given the availability of such a plan, there would even be the possibility on equity grounds of making higher education more nearly self-supporting in terms of tuition fees. An individual whose earning power or social position had been enhanced through public expenditures could well be considered to owe an extra quantum of financial support to the State, as compared with an individual reaching a comparable status by his own relatively unaided efforts. Such financing might also induce a more liberal attitude toward the fulfilling of educational requirements on the part of budget-minded and tax-conscious legislators.

Such equity investment in the education of individual students on a mutual basis that is nevertheless fully competitive with other investments will not provide the entire answer to the financing of higher education, but it would seem that the availability of some such procedure on a scale limited only by the demand would be capable of greatly improving the financial basis for utilization of a vast store of potential intelligence.

CHAPTER 17

Educational Expenditures and the Income Tax

Richard Goode[*]

A TAX ON NET INCOME should provide for tax-free recovery of the expenditures entailed in earning income, including investment outlays. Although this principle is generally applied in the Federal income tax, it is not applied consistently with respect to the costs of acquiring an income through personal services. Among these costs are educational expenditures that increase earning capacity or that are made for that purpose. In computing taxable income, no allowance is made for the costs of general education or of basic professional or vocational education, and only limited deductions are allowed for other educational expenses.

The present tax treatment of educational costs gives rise to inequities and is especially questionable at a time when the need for highly trained persons is growing. The income tax discriminates against persons whose earned income represents in part return of capital previously invested in education compared with persons who have invested little in preparation for their occupations. There is also discrimination against persons who invest in themselves compared with those who invest in physical assets. For example, a person who attends engineering school is usually not allowed to deduct his educational expenditures from his earnings, whereas a taxpayer who buys a truck can recover the cost through depreciation allowances. A physician who takes graduate courses to qualify himself for a new specialty cannot write off the cost against taxable income, though he can amortize outlays for office equipment, laboratory facilities, or waiting room furniture. When income tax rates are high, discrimination against investment in education may discourage entry into occupations requiring expensive training, and may discourage persons already at work from preparing themselves for more skilled and responsible jobs.[1]

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[*] Senior staff member of Brookings Institution. The author calls attention to the fact that interpretations and opinions are his own and do not necessarily reflect the views of officers or other staff members of the Brookings Institution.

[1] Richard Goode. The Income Tax and the Supply of Labor. *Journal of Political Economy*, 57: 428–437. October 1949. Reprinted in American Economic Association, *Readings in the Economics of Taxation*, Richard A. Musgrave *and* Carl S. Shoup, *eds.*, Homewood, Ill., Richard D. Irwin, 1959. p. 456–469.

Two factors greatly mitigate the discrimination against education. First, tuition and fees are not charged in public elementary and secondary schools; and in colleges and universities the charges are usually much lower than the costs of instruction, with the difference being made up by State and local government funds, gifts, and endowment income. Secondly, a large part of students' investment in education consists of opportunity costs in the form of foregone earnings. These costs are already free of income tax.

Many proposals have been advanced in recent years for deductions or credits under the income tax law for certain educational expenditures. Most of these proposals are intended to grant tax relief to parents of college students. There has been little systematic discussion of broad questions of tax policy respecting educational expenses or technical problems that would be involved in development of new income tax provisions relating to education.

This paper reviews the present treatment of educational expenditures under the Federal income tax and considers the possibility of permitting certain educational expenditures to be charged against taxable income through current deductions or amortization allowances.[2] Attention is given to the technical difficulties of devising a feasible plan for this purpose and to the probable effects of such a plan on Government revenues, on enrollments and tuition charges, on the amount of educational expenditures, and on occupational choice. Proposals for deductions or tax credits allowed to parents of college students are briefly compared with the more general approach to the problem.

I. Present Treatment of Educational Expenditures

The Federal income tax makes no provision for current or future deductions for expenditures incurred for education or training undertaken to prepare oneself for a vocation or profession or to meet the minimum qualifications for any employment. Deductions are allowed for expenditures for certain kinds of supplementary, continuation, or refresher courses. Official regulations adopted in 1958 provide that—

> Expenditures made by a taxpayer for his education are deductible if they are for education (including research activities) undertaken primarily for the purpose of:
>
> (1) Maintaining or improving skills required by the taxpayer in his employment or other trade or business, or

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[2] "Amortization" is a procedure by which the cost of an asset is charged against income over a period of time through annual allowances or charges. The word is often used as a synonym of "depreciation," but is more commonly applied to intangibles than to tangible property.

> (2) Meeting the express requirements of a taxpayer's employer, or the requirements of applicable law or regulations, imposed as a condition to the retention by the taxpayer of his salary, status, or employment.[3]

The regulations state that deductions will ordinarily be allowed for the cost of education for the purpose of maintaining or improving skills "if it is customary for other established members of the taxpayer's trade or business to undertake such education." Deductions for required education are restricted to expenditures "for the minimum education required by the taxpayer's employer, or by applicable law or regulations, as a condition to the retention of the taxpayer's salary, status, or employment."

On the other hand, the regulations provide:

> Expenditures made by a taxpayer for his education are not deductible if they are for education undertaken primarily for the purpose of obtaining a new position or substantial advancement in position, or primarily for the purpose of fulfilling the general educational aspirations or other personal purposes of the taxpayer. The fact that the education undertaken meets express requirements for the new position or substantial advancement in position will be an important factor indicating that the education is undertaken primarily for the purpose of obtaining such position or advancement, unless such education is required as a condition to the retention by the taxpayer of his present employment. In any event, if education is required of the taxpayer in order to meet the minimum requirements for qualification or establishment in his intended trade or business or specialty therein, the expense of such education is personal in nature and therefore is not deductible.[4]

Illustrating the meaning of these rules, the authors of the regulations mention the case of A, who is employed by an accounting firm and who takes courses to enable him to qualify as a certified public accountant. Expenditures for these courses are not deductible, as they were made before A became qualified as a CPA. B, a general practitioner of medicine, takes graduate courses in order to become a specialist in pediatrics and is allowed no deductions for his expenses. C, a less ambitious general practitioner, takes "a 2-week course reviewing developments in several specialized fields, including pediatrics, for the purpose of carrying on his general practice" and is entitled to deductions for his expenses. D is a schoolteacher who is required by his employer or by law "either to read a list of books or to take certain courses" in order to hold his job. After completing the prescribed courses, he receives a master's degree and is given an automatic salary increase. D can deduct his educational expenses. G, a graduate student at a university, aspires to become a professor and must obtain an advanced degree to do so. While working toward the degree, G is a part-time teacher at the university. His educational expenses are not deductible since he has not completed the education required to become qualified as a regular faculty member.

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[3] Regulations, 1.162-5 (T.D. 6291, *Internal Revenue Bulletin*, Cumulative Bulletin, 1958-1, p. 67).

[4] Ibid.

In attempting to limit deductions to educational expenditures that are clearly related to the taxpayer's income from his current employment, the authors of the regulations have excluded educational outlays that contribute to future earning capacity and which for this reason have great economic significance for the individual and for society. If a similar attitude were taken toward physical capital, deductions from taxable income presumably would be allowed for maintenance expenditures and capital replacement costs, but would be denied for depreciation on capital outlays intended to establish new firms, to enlarge existing enterprises, or to introduce new products. The regulations concerning educational expenditures discriminate against the new man and the ambitious, compared with the established and the timeserver. Unsatisfactory as the present rules may seem, readers may wish to suspend judgment on the regulations until they consider the difficulties that would be involved in formulating more liberal rules without opening loopholes. These problems are examined in a later section of this chapter.

Two other features of the income tax that relate to educational expenditures are the provision excluding scholarship and fellowship aid from taxable income[5] and the provision allowing parents to claim a $600 exemption for a son or daughter over 19 years of age who is a student and who receives more than half his support from his parents, even though he would otherwise not qualify as a dependent because his gross income exceeds $600.[6]

II. Possible Plan for Deduction or Amortization of Educational Expenditures

The logic of the net income tax seems to imply that persons who make expenditures for education that increases their earning power, or that is intended to do so, should be permitted to capitalize these outlays and write them off against taxable income through depreciation or amortization allowances. Income-producing educational expenditures are investments with a limited life and, if it is feasible, they should be given the same tax treatment as other investments. Failure to allow tax-free recovery of educational outlays means that the income tax falls in part on the return of capital rather than on net income.

Though they may suffer discrimination under the income tax, persons who obtain much formal education benefit from the fact that tuition charges are generally far lower than the costs of instruction. On balance, those who attend a college or university no doubt receive favorable treatment from society. The present income tax treatment, however, does not reflect a conscious recognition of the subsidy received by students. The income tax discrimination is most severe against those who receive the smallest subsidy in the form of below-cost tuition charges. Low average tuition charges do not wipe out inequities that are due to failure to allow educational expenses to be written off against taxable income, but the lowness of tuition charges does reduce the possible adverse effect of the income tax on private investment in education and on occupational choice.

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[5] Internal Revenue Code, sec. 117.

[6] Internal Revenue Code, secs. 151, 152.

Although an allowance for income-increasing educational expenditures is consistent with the theory of net income taxation and might be highly desirable from the point of view of social policy, great practical difficulties would be encountered in devising and administering an acceptable plan to put the principle into effect. These difficulties are attributable to the mixed nature of educational expenditures, which include consumption as well as investment elements, the lack of legal and accounting conventions formalizing the economic aspects of education, and other complications. In order to bring out some of the more significant issues, I shall attempt to give the broad outlines of a plan that might prove acceptable. My suggestions are highly tentative, and on some points I have not been able to make definite recommendations. I recognize the need for further debate and technical work on the subject.

ALLOWANCE TO WHOM?

The general principle is that costs incurred to acquire a taxable income should be charged against taxable income. Applied to education, the principle indicates that the personal costs [7] of that education which increases earning capacity should be written off against the taxable income attributable to the education. This means that the writeoff should be available to the person receiving the education and the income.

Students might properly be allowed current or deferred deductions for their own educational expenditures and for outlays on their behalf by their parents, relatives, or friends. Expenditures by parents or other persons could be considered as equivalent to gifts to the student. He would be allowed to recover free of income tax the value of these gifts just as he can now write off against income the cost of a depreciable asset acquired as a gift or through the expenditure of money received as a gift.[8] As a rule, no gift-tax problem would be involved because the amounts advanced by parents and others for amortizable expenditures would ordinarily fall within the $3,000 annual exemption under the gift tax. (Logically, this approach would imply that eligible educational expenditures should not be considered "support" in determining whether a student is a dependent.) The privilege of writing off against taxable income the value of gifts in the form of education probably should not extend to the value of scholarships and other aid received from educational institutions, governmental units, corporations, or other organized bodies. These awards are presumably intended to promote the general welfare rather than the economic interests of the recipient.

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[7] The phrase "personal costs" is intended to mean costs met by students or by parents or other individuals on behalf of students, as distinguished from costs met by publicly or privately controlled educational institutions, governmental bodies, foundations, or other organizations.

Most past discussions of the relation between the income tax and educational expenditures have centered on the question of who pays the personal costs rather than who receives the return. This approach has led to proposals for income tax deductions or tax credits to parents or others who finance education. Deductions or credits allowed to parents, however, cannot be justified on the basis of a general definition of income; they must be regarded as a means of subsidizing and encouraging family support of students. Proposals of this nature are briefly examined in a later section.

ELIGIBLE ITEMS

If an allowance is to be made for educational costs, decisions will have to be made concerning the kinds of education that will be eligible and the components of total educational expenditures that will be charged against income. General income tax principles suggest that deductions should be granted, either currently or through amortization allowances, for education that is undertaken for the purpose of adding to earning power. The emphasis on the purpose of the expenditures, rather than on their results, is in accord with established practice. "Ordinary and necessary" business and professional expenses are deductible without a showing that any gross income is directly attributable to the particular items of expense. In doubtful cases and in respect of nontrade or nonbusiness expenses for the production or collection of income, the intent of the taxpayer is highly important in determining deductibility, although not always controlling. Usually some reasonably objective evidence can be adduced to corroborate or refute a claim that an expenditure was made in order to obtain income.[9]

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[8] Internal Revenue Code, secs. 167, 1011, 1015.

[9] Internal Revenue Code, secs. 162(a), 212; Regulations 1.162–1, 1.212(1). The intent of the taxpayer is highly significant in indicating whether an activity is a business or a hobby and in determining whether deductions will be allowed for expenditures for items such as professional association or club dues, specialized books and journals, attendance at conventions, travel, entertainment, and rental of safe deposit boxes.

In determining whether expenditures for a class of education should be considered costs of earning income, primary reliance might be placed on the intent of the taxpayer. The apparent influence of the education on earning capacity would constitute an important secondary criterion that might be decisive when motivation was uncertain. A precise measure of earning capacity would not be required, but merely an indication whether a significant influence could reasonably be expected on the basis of the experience of other persons who have acquired similar education, or other evidence.

Basic professional, technical, and vocational education may be presumed to be motivated primarily by economic considerations, and the same may be said of a refresher course and supplementary training relating directly to the occupation of the person taking it. The connection between such education and earning capacity is fairly clear, and current deduction or amortization could properly be allowed so long as the amounts were reasonable. On the other hand, elementary education seems to have little economic motivation and to have no claim for consideration as an investment for income tax purposes. It is much more difficult to classify college liberal arts education and high-school education. General college education increases earning capacity and is surely motivated in part by this consideration even when pursued primarily for its cultural and civic values. An attempt to distinguish clearly between general education and vocational or professional education in colleges and universities, furthermore, would encounter serious difficulties. Undergraduate students in business administration, teacher-training, engineering, and other professional fields take general courses as well as specialized courses, and many courses are hard to classify. General education, moreover, is less subject to obsolescence than highly specialized training and may often constitute a better investment from the strictly economic standpoint. The high-school curriculum also combines general education with vocational training, but economic considerations seem less important in high-school than in college. Rising standards of living and compulsory attendance laws, together with the development of public high schools, have greatly extended secondary education and reduced its personal costs. Although high-school attendance is still not universal, children can go to high school in their home communities at little direct monetary cost to their parents.[10]

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[10] Theodore W. Schultz outlines a somewhat similar ranking of attitudes toward different kinds of education, but places more emphasis on the investment aspect of high school attendance ("Education and Economic Growth," in National Society for the Study of Education, 60th yearbook, Nelson B. Henry, *ed.*, *Social Forces Influencing American Education, 1961*, Part 2, Chicago, University of Chicago Press, p. 52–53). In his 1960 presidential address to the American Economic Association and in private correspondence, Schultz suggests that educational expenditures be classified as investment or consumption by reference to their influence on earnings rather than by the purpose of the outlay. See his "Investment in Human Capital," *American Economic Review*, 51 : 1–17, March 1961. I hesitate to

Perhaps the best plan would be to allow the deduction or amortization of educational expenditures relating to: (1) any program of study leading toward a degree from an accredited college or university; (2) vocational training at a recognized trade school, business college, or similar institution; and (3) a supplementary, continuation, or refresher course of a predominantly professional or vocational nature taken at a recognized or accredited institution. Presumably the new treatment should apply only to expenditures made after its authorization. "Degree-credit students" at colleges and universities, in the terminology of the Office of Education, would qualify regardless of whether they obtained degrees or not. Part-time studies and correspondence courses as well as full-time resident study should be eligible. Expenditures for ordinary high-school studies would be classified as personal expenses rather than costs of earning income.

As regards college and university studies, this plan would err on the side of liberality. The allowance for all kinds of college and university courses would cover some educational expenditures that are in the nature of consumption, as judged by presumed motivation or apparent influence on income. At the present time, however, most college and university education seems to add to earning capacity, and it is difficult to rule out the possibility of economic motivation in connection with any part of it. The rate of private monetary return on total private costs of college education appears to be high—about 12½ percent net of income tax in 1940 and 10 percent in 1950, according to Becker's estimates.[11] If a large fraction of college costs were classified as consumption expenditures, the calculated rate of return on the remaining outlays would be high indeed. The imperfection due to a liberal allowance for college costs seems less objectionable, from the point of view of income theory and broad public policy, than that due to the present practice of permitting virtually none of these expenditures to be charged against taxable income.

The diversity of trade schools, business colleges, and similar institutions and the absence of a comprehensive accrediting system for them would complicate the application of administrative checks to assure that the expenses of study at these institutions were legitimate educational expenditures. Under the veterans' educational program

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recommend this approach for tax purposes for fear that it would discriminate against education, particularly new and unusual kinds of education, and because most existing measures of educational yield are very crude. Some estimates indicate higher rates of return on elementary education than on high-school and college education (Schultz, "Education and Economic Growth," op. cit., p. 81); this finding seems implausible and of doubtful relevance for tax policy.

[11] Gary S. Becker, Underinvestment in College Education? *American Economic Review, Papers and Proceedings of the American Economic Association*, 50: 346–354, May 1960. Becker's estimates are for urban white males. His figures on costs include forgone earnings, and returns are adjusted for differential ability. The decline in the rate of return between 1940 and 1950 is due almost entirely to higher income tax rates.

after World War II, difficulties and abuses were reported with respect to many of these institutions, particularly proprietary schools below college level. Standards were tightened in 1948 and again in the legislation providing benefits for Korean war veterans.[12] The need for controls of quality would presumably be less acute under a tax deduction or amortization plan than under the veterans' program inasmuch as the Government's share of the cost would be much smaller under the tax scheme.

The principal difficulty in connection with supplementary training and continuation or refresher courses, which are often undertaken on a part time basis, would be to distinguish vocational courses from other courses. Many extension courses, evening classes, and correspondence courses are almost entirely consumption, dealing with subjects such as hobbies, arts and crafts, current events, and music appreciation. Courses cannot always be distinguished on the basis of their content. A music course, for example, may be vocational training for one person but avocational for another. It seems that the best rule would be to allow current deductions or amortization charges only for expenses relating to education which the taxpayer represents as being primarily vocational or professional and which the authorities consider reasonably related to his occupation or occupational plans. The difficulties in applying this standard would be greater than those arising under the present rule, but they seem little if any more serious than the problems associated with deductions for items such as entertainment, travel expenses, and club memberships. The amounts involved may be smaller and many may feel that it is better public policy to be liberal with respect to educational expenses than with respect to some of the items now deductible.

The suggestion that no income tax allowance be made for ordinary high school education is debatable. There is considerable overlap between high school courses and the training offered by trade schools and business colleges, on the one hand, and by liberal arts colleges, on the other. For pupils in public high schools, however, the amount that could be written off would be small even if the plan were extended to them. Since most young people now go to high school, the principal effect of an income tax allowance for the personal costs of secondary education would be to encourage attendance at private schools.[13]

An alternative plan would be to treat as investment varying proportions of the personal costs of different kinds of education with the objective of reflecting differences in normal contribution to future earnings. For example, the proportions to be capitalized might range as follows: 100 percent for professional schools, postgraduate courses, and vocational training; 75 percent for general college and university studies; and 25 percent for high-school courses.[14] This approach has the merit of recognizing the mixed nature of educational expenditures. Any set of percentages chosen for the schedule, however, would be almost as arbitrary as the all-or-none rule previously suggested. The difficulty of distinguishing between professional or vocational studies and general studies would remain.

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[12] U.S. President's Commission on Veterans' Pensions, *Readjustment Benefits: Education and Training, and Employment and Unemployment*, Staff Report IX, part B, House of Representatives Committee on Veterans' Affairs, House Committee Print No. 291, 84th Cong., 2d sess., 1956.

[13] In 1959, 10.9 percent of high-school pupils were enrolled in private schools (*Statistical Abstract of the United States, 1960*, p. 107).

Current or deferred deductions might be allowed for expenditures for tuition and fees, books and equipment, and necessary travel relating to eligible education. No deduction should be granted for normal living expenses since these expenses would be incurred in any event. Although additional living expenses necessary to the educational purpose should in principle be deductible, the difficulty of distinguishing necessary additional expenses from normal or optional expenses would be great, and it seems advisable to deny deductions for living expenses. Alternatively, a small, fixed allowance for additional living expenses might be deductible for students while they are away from home.

Although foregone earnings of students are a large part of the real cost of education, it would not be necessary to allow this item to be written off against taxable income. This part of educational costs is already free of income tax. Students and others who directly invest their time and energy in the creation of an income-yielding asset, in effect, enjoy an immediate writeoff of investment costs. Because of time discount and uncertainty, an immediate writeoff is more valuable than a series of charges. Furthermore, the income tax does not directly reduce the capacity of a student to invest his time in his education. In contrast, a person who works for wages must pay an income tax, which leaves him less to invest.[15]

INCOME AGAINST WHICH EXPENDITURES ARE CHARGED

A strict rule would be to allow educational expenses to be charged only against income earned in the occupation for which the education prepared the taxpayer. This degree of refinement does not seem feasible or desirable in view of the great difficulty of establishing a clear connection between different kinds of education and activities. Professional education, for example, may be adaptable to the requirements of work in fields that are only loosely related to the specialty. A striking illustration is legal education, which has often been the route to leadership in business and politics. If a specific linkage between the kind of education and the source of earnings is not required, interruption of professional or vocational studies before completion of the course or failure to pursue the occupation for which one prepared should not disqualify one for the allowance for educational expenditures.

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[14] I am indebted to Prof. Theodore W. Schultz for this suggestion.

[15] The student's advantage is reduced if, as is likely, the marginal tax rate that would have applied to his earnings while he is a student is lower than the rate that applies to his later earnings.

It would seem reasonable to limit the deductions or amortization charges to earned income. Although education may make one a better investor, the relation between property income and amount of education is rather tenuous. If educational expenditures could be written off against property income, this might give an undue advantage to persons with inherited wealth. Even with the earned-income limitation, the applicable marginal tax rate and hence the value of the deduction would be influenced by the amount of property income received.

A politically sensitive problem would be presented by the case of housewives who do not work outside the home. It is suggested that no amortization allowance be granted for a housewife during any period in which she has no taxable earned income. Although the housewife's services have economic value and her contribution to the family's economic welfare is enhanced by her education, the value of her services does not enter into taxable income. Hence denial of a writeoff for educational costs that qualify the housewife to perform her services more effectively cannot be regarded as discriminatory in the same way as failure to take account of costs of earning a taxable income.

TIMING

By analogy with the treatment of the cost of physical assets, educational expenditures should be capitalized and written off against taxable income over the period in which they contribute to earnings. Ordinarily this period would be the whole normal working life of the person. This approach, however, might be cumbersome for major expenditures and ridiculous for small items.

It is tempting to suggest that the taxpayer be allowed to write off expenditures at any rate he chooses. This would leave him complete freedom in selecting the beginning date for amortization and would permit him to deduct his expenditures currently if that were most beneficial. Most students do not have enough income to be liable for tax, and in professions such as medicine and law, earnings are often small in the first few years of practice. Usually therefore students would wish to postpone the beginning of amortization until they left school or perhaps a few years later. On the other hand, students who earn enough to be subject to income tax would find it especially helpful to deduct educational expenditures currently. If the deductions were taken currently, much of the recordkeeping that would be involved in amortization over a long period of time would be avoided. Complete freedom to the taxpayer in timing the amortization of educational expenditures, however, may be considered too liberal so long as similar treatment is not accorded to those who invest in physical assets. Because of time discount, an immediate writeoff of the cost of a capital investment may be much more advantageous than a writeoff extending over a long period of time. At a compound interest rate of 5 percent, for example, the present value of a series of annual deductions of equal size extending over 20 years in the future is only 62 percent of the face amount of the deductions. A precedent for liberality respecting the timing of deductions exists in the treatment of research and experimental expenses of a trade or business. These expenses may be currently deducted, or capitalized and written off over a period of 5 years or more, at the option of the taxpayer.[16]

A possible compromise would be to allow persons incurring major educational expenses to capitalize their outlays and amortize them over a fixed period of say 20 years, or the period ending when the taxpayer reaches age 65 if that is shorter. The taxpayer could appropriately be given some leeway as to the date at which amortization would begin. Taxpayers incurring minor educational expenses might be given the option of capitalizing their outlays or deducting them currently. Major and minor expenses could be defined in terms of percentages of current income. Outlays by full-time students would nearly always be major expenses. Most expenditures for supplementary training or refresher courses would qualify as minor expenses and thus would be currently deducted or capitalized at the taxpayer's option.

Persons who die before the end of the amortization period would not have completed the writeoff of their educational expenses. In such cases it would seem reasonable to allow the unamortized balance to be deducted in the last taxable year.[17] If this deduction reduced the income below zero, a carryback of net loss might be allowed and a refund of taxes for prior years granted. Similar treatment could be justified for a person who becomes totally and permanently disabled. It might be urged for women who marry and withdraw from the labor force, but the termination of the amortization period would not be clearly appropriate in these cases since many married women leave their jobs but later resume employment outside the home.

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[16] Internal Revenue Code, sec. 174.

[17] Under present law, when depreciable property (tangible or intangible) suddenly loses its usefulness and is discarded, the difference between its depreciated cost and salvage value, if any, may be deducted from income (Income Tax Regulations 1.167(a)-8).

III. Effects of Revised Treatment of Educational Expenditures

The effects of allowing educational expenditures to be charged against taxable income may be considered from the standpoint of Government revenues, college and university tuition charges and enrollments, and occupational choice.

REVENUES

Government revenues would be reduced unless offsetting increases in tax rates were adopted. Under a plan allowing current deduction of minor educational expenses and amortization of major outlays for education, the full impact would be felt only after a period of years roughly equal to the amortization period. Over the transition period the annual charges would build up year by year. They would increase thereafter to reflect the growth of population and of educational expenditures.

The available data permit rough estimates of expenditures for education in colleges and universities, but not for trade schools, correspondence schools, and other educational institutions. Reliable statistics are available for tuition and fees paid to colleges and universities, including tuition and fees for extension courses, adult education, and instruction by mail, radio, and television. There are data on which estimates of other expenditures of students at colleges and universities can be based. Some of the relevant information is summarized in table 1. The estimates given in the table for books and supplies and for travel may be somewhat too high. Mean expenditures of full time students were used in developing the estimates, but were applied to enrollment figures that include part-time students as well.

In estimating the revenue loss, an allowance has to be made for the expenditures of women who marry and withdraw from the labor force before completing the amortization of their educational outlays and for the expenditures of those who die before completing the amortization period. In March 1957 one-half of the women in the age group 25 to 64 who had one or more years of college education were in the labor force.[18] Rates of participation in the labor force were higher among younger women who had attended college but who were not currently enrolled, and were also higher among women with 4 or more years of college attendance than among those with briefer attendance. Many college women who were not in the labor force in 1957 had previously been employed or would be employed in the

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[18] U.S. Bureau of the Census, *Current Population Reports*, Series P-20, No. 77, Population Characteristics (Dec. 27, 1957), and Series P-50, No. 78, Labor Force, November 1957.

TABLE 1.—Estimated expenditures of students for selected items: colleges and universities, United States, 1953–54; 1955–56; 1957–58; and projected, 1969–70

[In millions]

Item	Expenditures by year			
	1953–54	1955–56	1957–58	1969–70
Total	$827	$1,038	$1,324	$3,101
Tuition and fees [1]	508	667	873	2,209
Books and supplies [2]	129	152	184	367
Travel [2] [3]	190	219	267	525

[1] Estimated from U.S. Department of Health, Education, and Welfare, Office of Education, Biennial Survey of Education in the United States 1952–54, *Statistics of Higher Education: Receipts, Expenditures and Property, 1953–54*, and similar statistics for 1955–56, and from unpublished data compiled by the Office of Education for the 1957–58 edition. The figures represent tuition and fees from students for instruction and for plant expansion or debt retirement, minus the amount of tuition and fees covered by fellowships, scholarships, and prizes administered by colleges and universities (estimated at two thirds of the institutions' expenditures for these awards). *See* John F. Meck, testimony on behalf of American Council on Education, House Ways and Means Committee, *Hearings on General Revenue Revision*, 85th Cong., 2d sess. (1958), pt. 1, p. [illegible]. The total includes college and university tuition receipts from extension courses and instruction by mail, radio, and television.

The 1969–70 figure is based on the estimate of $2,427 million for total tuition and fees projected by Robert D. Calkins ("Government Support of Higher Education" in *Financing Higher Education, 1960–70*, Dexter M. Keezer, ed. New York, McGraw-Hill Co., 1959, p. 197), reduced by estimated sums from scholarships, fellowships, and prizes which are assumed to amount to 9 percent of total tuition and fees (the 1957–58 percentage).

[2] Derived by multiplying the number of students enrolled by the amount of estimated mean expenditures for the item. Enrollment figures are from the U.S. Office of Education academic year enrollment series reported in the Biennial Survey of Education 1953–54, and by Seymour E. Harris in *Financing Higher Education, 1960–70*, op. cit., p. 74. Mean expenditures are estimated from survey data for 1952–53 (adjusted for price changes) by Ernest V. Hollis and associates, *Costs of Attending College* (U.S. Department of Health, Education, and Welfare, Office of Education, Bulletin 1957, No. 9.) p. 40.

For books and supplies, the price index used is the "Reading and recreation" component of the Bureau of Labor Statistics Consumer Price Index; for travel, the "Transportation" component. The 1969–70 figure is based on mean expenditures computed at 1959–60 price levels.

[3] Travel between home and college or university; excludes travel between college address and campus and "other" travel.

future. On the other hand, some of those who were employed would work only a short time. I assume that one-fourth of eligible expenditures of women students at colleges and universities could not be amortized under a general plan because of lack of earned income against which to claim the deductions. In recent years women students accounted for about one-third of college and university enrollment.[19] On the assumption that average expenditures of women students are equal to those of men students, it follows that the "wastage" of amortization deductions of women students would amount to about 8 percent of total outlays for eligible items by college and university students. Even with a final-year adjustment, as suggested above, death or disability would prevent some men and women from completing the amortization of their investment.[20] An allowance for unemployment should perhaps be added, but this should not be large if prosperity is fairly well maintained inasmuch as short-term unemployment would usually not prevent amortization. All told, the wastage of amortization deductions might be about 10 percent.

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[19] U.S. Department of Commerce, Bureau of the Census, *Statistical Abstract of the United States 1959*, p. 106.

[20] On the basis of 1956 mortality rates for white males (*Statistical Abstract of the United States 1959*, p. 60), it may be calculated that, of a group aged 25, about 4 percent would die before reaching age 45, and that on the average about 98 percent would be living during the 20-year period. I have not found comparable statistics of disability.

It seems safe to assume that, so long as income tax exemptions remain at approximately their present level in relation to average income, nearly all former college students will have incomes large enough to be subject to tax when they are employed. Selection of an appropriate marginal rate of income tax is more difficult. The average income of persons who have attended college is considerably higher than the average income of others, but apparently not high enough to raise a large proportion of them into upper tax brackets. In 1958, 23 percent of male college graduates with money income received more than $10,000; only 1.5 percent of women graduates with money income were in this class.[23] I assume that, with present rate schedules, the weighted average marginal rate of income tax applicable to former college students is about 25 percent. (Under present law the marginal rate for a married couple with two dependent children rises from 22 percent to 26 percent at an income of approximately $12,000.)

These estimates and assumptions indicate an ultimate revenue loss of roughly $300 million if amortization or deduction had been allowed for 1957–58 expenditures of college and university students for tuition and fees, books and supplies, and travel (see table 1). The total revenue loss would be associated with 1 year's expenditures, but would occur only over a period of 20 years if the suggestions made above concerning amortization were adopted. After introduction of the plan, the annual revenue loss would increase year by year as successive groups began to claim deductions or amortization allowances for expenditures made in later years. If students' expenditures remained constant at the 1957–58 level, the annual revenue loss would stabilize at approximately $300 million after 20 years. Educational expenditures, however, can be expected to increase rapidly with the growth of enrollment and with probable increases in tuition charges. On the basis of projected increases in enrollment and tuition charges, but assuming no change in prices of other items, amortizable or deductible expenditures made in 1969–70 may be placed at $3.1 billion or more. On the assumption of a 25-percent marginal tax rate and 10 percent "wastage" of deductions, the ultimate revenue loss with respect to that year would amount to $0.7 billion, spread over two decades. These estimates make no allowance for an increase in taxable income due to a stimulus to education provided by tax revision.

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[23] U.S. Department of Commerce, Bureau of the Census, *Current Population Reports*, Series P-60, No. 33, Consumer Income, Jan. 15, 1960, p. 38.

INFLUENCE ON TUITION CHARGES AND ENROLLMENTS

The adoption of a plan allowing educational expenditures to be written off against taxable income would probably encourage colleges and universities to raise their tuition charges and fees. Tuition charges are well below instructional costs at most institutions, and the institutions face financial problems. The extent of the increase in charges cannot be forecast with confidence, but informed observers have generally agreed that tax relief for parents of students would lessen the reluctance of colleges and universities to raise charges. Amortization for students is less closely related to the ability of parents or students to meet increased charges, but the adoption of an amortization plan would no doubt increase to some degree capacity and willingness to pay tuition charges.

The amortization plan would complement an arrangement providing higher tuition charges and long-term credit facilities to enable needy students to pay the charges. That system would formalize the resemblance between educational expenditures and investment in physical assets. If liberal credit and tax amortization were available, much could be said for a policy of raising tuition charges high enough to cover the full marginal costs of instruction in courses that are predominently vocational or professional in nature.[22] The argument for higher tuition charges would be especially persuasive in regard to professional fields such as medicine, where educational costs and earnings are much above the average. Students in these fields now pay only a small fraction of the costs of their education.

Any action that reduces the net cost of tuition payments or facilitates borrowing to cover educational expenses should induce some students who would otherwise have attended public institutions to apply for admission to private colleges and universities. Adoption of an amortization plan would result in tax savings ultimately amounting to perhaps one-fourth of expenditures for tuition and fees and other eligible items. As already noted, however, the fact that the tax savings would be realized in installments over a period of years would considerably reduce their significance. Although it seems clear that the plan would stimulate enrollment in private institutions compared with that in public ones, the probable extent of this influence is hard to appraise.

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[22] Milton Friedman. "The Role of Government in Education," in *Economics and the Public Interest*, Robert A. Solo, *ed.* New Brunswick, N.J., Rutgers University Press, 1955. p. 123–144.

INFLUENCE ON EDUCATIONAL EXPENDITURES AND OCCUPATIONAL CHOICE

In present circumstances, it seems unlikely that adoption of a plan for amortization of educational expenditures would have a great influence on the total investment in education and on the choice between occupations requiring different amounts of such investment. The role of economic calculations in educational and occupational choices is uncertain, and the tax benefits of an amortization plan would equal only a small proportion of the total personal costs of college and university education. Forgone earnings of college and university students, which are a part of personal costs but which would not be amortizable, are much larger in the aggregate than expenditures for items which might properly be subject to amortization (tuition and fees, books and supplies, and travel). In academic years 1955–56 and 1957–58, the amortizable items accounted for only about 15 to 17 percent of estimated total personal costs of college and university education, exclusive of any additional living expenses of students; the remaining 83 to 85 percent of personal costs consisted of forgone earnings.[23]

On the assumption of a 25-percent marginal tax rate, it appears that the tax saving attributable to amortization of educational expenditures would have equaled only about 4 percent of total personal costs of college and university education under conditions prevailing recently. This figure should be discounted because of the distribution of the tax saving over a period of years. An item as small as this can hardly be a strong influence on the amount of educational expenditures or on occupational choice.

The tax benefits from amortization would not represent a major fraction of personal costs of even the most expensive kinds of education. Although students' outlays for tuition and fees and other expenses at [illegible] prestige colleges and at professional schools of private universities are much larger than average expenditures for all colleges and university students, forgone earnings are still the largest item of personal education costs. For example, I estimate that, at approximately 1959–60 prices and wage rates, the total personal cost of a medical education at private institutions, including a 4-year premedical course at an "Ivy League" college, 4 years at a private medical school, and a 1-year internship, averaged roughly $15,500. (Many physicians also serve residencies in order to qualify as specialists.)

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[23] See estimates of expenditures for tuition and fees, books and supplies, and travel, table 1. Theodore W. Schultz estimates forgone earnings of college and university students at $5,821 million in 1955–56. See "Capital Formation by Education," *Journal of Political Economy*, 68: 580, December 1960. Applying Schultz's method, I estimate forgone earnings in 1957–58 at $6,570 million. My estimate, however, relies on the Department of Labor figure for unemployment rather than on the series compiled by Clarence D. Long, which Schultz uses for 1955–56.

Of the $45,500, about $33,500 represented forgone earnings and $12,000 tuition and fees, books and supplies and equipment, and travel (see table 2). Under an amortization plan, $12,000 could be written off against taxable income at a rate of, say $600 a year. Although this sum is not insignificant, the tax saving, assuming a 30-percent marginal tax rate, would amount to only 8 percent of the personal investment in the physician's education.[24]

TABLE 2.—Estimated personal cost of medical education (at 1959-60 prices and wages)

Cost item	1 year	Total
Premedical course:		
Tuition and fees [1]	$1,380	$5,520
Books and supplies [2]	57	228
Travel [2]	109	436
Subtotal	1,546	6,184
Forgone earnings [3]	2,146	8,584
Total, premedical course	3,692	14,768
Medical school:		
Tuition and fees [4]	1,110	4,440
Books and supplies [4]	150	600
Microscope [5]	350	350
Travel [2]	109	436
Subtotal	1,719	5,826
Forgone earnings [6]	5,441	21,764
Total, medical school	7,160	27,590
Internship: Forgone earnings [7]	3,093	3,093
Total, all items		45,451

[1] Mean for 8 "Ivy League" colleges (Brown, Columbia, Cornell, Dartmouth, Harvard, Pennsylvania, Princeton, and Yale), 1959-60, *American Universities and Colleges*, Mary Irwin, ed. Washington, D.C., American Council on Education, 8th edition, 1960.

[2] Mean expenditures of undergraduates in private colleges in 1952-53, adjusted for price changes. For derivation, see table 1, footnotes 2 and 3.

[3] Average for all college and university students, 1960, derived by the method used by Theodore W. Schultz in "Capital Formation by Education," *Journal of Political Economy*, 68:575, December 1960. Adjustment for unemployment based on a Department of Labor estimate of the unemployment rate as a percentage of the civilian labor force (*Economic Indicators March 1961* prepared for the Joint Economic Committee by the Council of Economic Advisers, U.S. 87th Cong., 1st Sess., House of Representatives).

[4] Median minimum expenses of first year medical students in 45 private medical schools, 1960-61, from American Medical Association, Council on Medical Education and Hospitals, *Medical Education in the United States and Canada*, reprint from *Journal of the American Medical Association*, 174, 1423-1476, Nov. 12, 1960.

[5] Median, 1956-57, from U.S. Congress, *Medical School Inquiry*, Staff Report to House Committee on Interstate and Foreign Commerce, 85th Cong., 1st sess., House of Representatives, 1957 Committee print. p. 388.

[6] Median starting salary of $5,880 for inexperienced male graduates in chemistry with a B.S. degree, 1959-60, from American Chemical Society, "1960 Starting Salary Survey," *Chemical and Engineering News*, 38:107, Oct. [illegible], 1960, reduced by $439, the estimated earnings of the student during the year. The student's current earnings were estimated by increasing the estimated average for dental students in 1953-54 (American Dental Association, *How Students Finance Their Dental Education*, 1956, p. 49) by an index of average gross weekly earnings in manufacturing (derived from U.S., *Economic Report of the President*, transmitted to the Congress Jan. 20, 1960, p. 184, and *Economic Indicators March 1961*, op. cit.). The total for this item is 4 times the 1-year figure.

[7] Difference between (a) entrance salary (General Services, grade 9, $6,285 a year) under the Federal civil service for one who has successfully completed graduate study in biochemistry equivalent to the requirements for a doctor's degree, including the thesis (U.S. Civil Service Commission Announcement No. 163B, issued July 22, 1958, supplemented May 2, 1960), and (b) estimated annual compensation of interns in university affiliated hospitals in 1959-60. The average salary of interns in hospitals affiliated with medical schools was $166 a month, $1,992 for 12 months, as reported in Graduate Medical Education in the United States, *Journal of the American Medical Association*, 174:575, Oct. 8, 1960. Many interns also receive room, board, and other maintenance, and these items were valued at $1,200 for 12 months. The median cost of room and board at private medical schools in 1959-60 was $900, presumably for 9 months (*Medical Education in the United States and Canada*, op. cit.). Total compensation is therefore estimated at $3,192 and forgone earnings at $3,093.

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[24] Unpublished estimates by Roy E. Moor for the U.S. Public Health Service indicate that physicians (M.D.'s) in the United States received an average net income of $16,500 from medical practice in 1958. A married person with this income would be subject to a 30-percent marginal rate of Federal income tax.

If tuition and fees were increased to cover a much larger fraction of total educational costs, the amortization plan would become more significant; nevertheless, amortizable expenses would still represent only a minor part of total costs, owing to the importance of forgone earnings. If, for example, in 1955–56 and 1957–58 tuition and fees had covered all educational costs of colleges and universities, amortizable expenses of students would have equaled only about 40 to 44 percent of total costs.[23] In fields such as medicine and dentistry, where instructional costs are high, the fraction might be somewhat greater but probably not strikingly so, inasmuch as forgone earnings are larger for students in professional schools than for the average student.

It could be argued that, in appraising the influence of amortization of educational expenses, students' benefits from the tax provision should be related to their money outlays for education rather than to total personal costs, including forgone earnings. One basis for this approach might be the hypothesis that, in decisions relating to education and occupational choice, opportunity costs are given much less weight than money expenditures. Granted that many students and parents may not carefully calculate forgone earnings, I do not believe that we should assume that opportunity costs have no influence. Opportunity costs are taken into account partly in the form of students' living expenses, which are included in most published material on educational costs, but not in the estimates presented in this paper. The calculation of opportunity costs requires less sophistication and foresight than the evaluation of the tax benefits due to amortization of educational expenses, and those who ignore opportunity costs might also overlook the more remote advantages of amortization.

A more persuasive reason for concentrating on money outlays, including living expenses but not all forgone earnings, is the possibility that these costs will be financed by borrowing. The availability of tax amortization might increase the willingness of students to borrow and might cause creditors to regard these loans as better risks.

IV. Deductions or Tax Credits Allowed to Parents of Students

In recent years there has been considerable discussion of the possibility of allowing income tax deductions or credits for certain educational expenditures. In 1953 the House Ways and Means Committee selected college and educational expenses as one of 40 topics for study in preparation for a revision of the Internal Revenue Code.[26] The President's Committee on Education Beyond the High School recommended in 1957 that—

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[23] Based on estimated total costs of $9,692 million in 1955–56 and $11,681 million in 1957–58. These totals include my estimates of students' expenditures on books and supplies and travel (table 1); Schultz's estimates of forgone earnings and institutional costs in 1955–56 ("Capital Formation by Education," op. cit., p. 579–580); and, for 1957–58, my estimates of forgone earnings ($6,570 million) and institutional costs ($4,660 million), made by Schultz's method. The figures for institutional costs include all college and university operating costs (except costs of auxiliary enterprises) and implicit interest and depreciation on physical property, thus covering costs of research and administration as well as costs of instruction.

> . . . the Federal revenue laws be revised, with appropriate safeguards, in ways which will permit deductions or credits on income tax returns by students, their parents or others, who contribute to meeting the expenditures necessarily incurred in obtaining formal education beyond high school; and, further, that provisions be included which will grant proportionately greater tax benefit to those least able to afford those expenditures."[27]

The 1960 platform of one of the major political parties favored "consideration of means through tax laws to help off-set tuition costs" without specifying the form of the assistance.[28]

A large number of bills relating to expenses of attending college or university have been introduced in Congress in recent years. Although the bills commonly provide a deduction or tax credit for a person incurring expenditures for himself or for a dependent, the following comments relate solely to the tax relief that would be offered to parents of college students. The analysis, although incomplete, deals with the more important aspect of the bills. Parents, on the average, pay a larger fraction of the money costs of college education than students do and parents also have higher taxable incomes.[29]

Proposals for the deduction from taxable income of educational expenditures have been criticized on the grounds that they would grant proportionately more relief to high-income families than to those with low incomes. The tax saving attributable to any deduction varies directly with the marginal tax rate, and in the graduated schedules employed in the United States, marginal rates rise to high levels for large incomes. Critics have pointed out that a deduction for college expenses would give the largest benefits to families with the least need for financial assistance, and they have expressed the fear that such a plan would accentuate the tendency for college enrollment to be drawn from families with incomes much above the national average.

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[26] U.S., 83d Cong., 1st sess., part I. *General Revenue Revision.* Hearings before the Committee on Ways and Means, House of Representatives, 1953. p. 177–201.

[27] U.S., The President's Committee on Education Beyond the High School, *Second Report to the President*, July 1957. p. 11.

[28] *Platforms of the Democratic Party and the Republican Party, 1960* (Ralph R. Roberts, Clerk, U.S. House of Representatives, September 1960). p. 68.

[29] U.S. Department of Health, Education, and Welfare, Office of Education, *Costs of Attending College*, Ernest V. Hollis *and associates*, OOE Bull. 1957, No. 9, p. 48; John B. Lansing, Thomas Lorimer, *and* Chikashi Moriguchi, *How People Pay for College*, Ann Arbor, Mich., Survey Research Center, Institute for Social Research, University of Michigan, 1960; American Dental Association, *How Students Finance Their Dental Education*, 1958, p. 49; U.S. Department of Health, Education, and Welfare, Public Health Service, *Physicians for a Growing America*, Report of the Surgeon General's Consultant Group on Medical Education, PHS Pub. No. 709, 1959, p. 20.

These objections have prompted the suggestion that parents or others be allowed a tax credit equal to a stated percentage of certain expenditures rather than a deduction for these expenditures. A credit is subtracted from the tax liability otherwise due rather than from taxable income. To illustrate, a 30-percent credit would give a $300 tax reduction to parents who incur $1,000 of eligible expenses for a son or daughter in college. For persons whose tax liability would exceed the amount of the credit, a uniform credit offers benefits equal to the same fraction of eligible expenditures regardless of income level and marginal tax rate. Parents whose incomes are so low that they pay no income tax would receive no assistance, and those whose tax liability is less than the amount of the credit would not be able to take full advantage of it. It appears, however, that only a small minority of parents of college students would be subject to these limitations under most of the tax credit proposals. A considerably greater part of the total tax reduction would accrue to low-income and middle-income families under a tax credit than under a deduction plan costing the Government the same amount of revenue.[30] The credit approach has been endorsed by the American Council on Education[31] and has been embodied in several bills introduced by Members of Congress.

The proposed tax credits or deductions allowed to parents of college students would provide immediate tax relief. Government revenues would therefore be reduced more quickly than by an amortization plan covering the same expenditures. In the long run, however, the revenue effects of current deductions and amortization allowances would be much the same, provided the same items were charged against income. A tax credit for particular items would bring about more or less of a revenue loss than a deduction of the same items, depending on whether the credit rate was higher or lower than the weighted marginal rate of income tax. The two approaches would have qualitatively similar influences on the amount of educational expenditures, enrollment at public and private educational institutions, tuition charges, and occupational choice. But in all these respects an immediate deduction or credit allowed to parents would doubtless be more powerful than amortization allowances for students that would bring about the same loss of revenue over a period of years.

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[30] For a statistical comparison, see *Stimulating Voluntary Giving to Higher Education and Other Programs*, prepared for the American Association for the Advancement of Science, Washington, Surveys and Research Corporation, 1958, p. 109–130.

[31] The council's proposal called for a 30-percent credit for college tuition and fees, subject to a limit of $450 of credit per student year. See U.S., 85th Cong., 2d sess., pt. I, *General Revenue Revision*, hearings before the Committee on Ways and Means, House of Representatives, 1958, p. 1061–1068; and John F. Meck, "The Tax-Credit Proposal," in *Higher Education in the United States: the Economic Problems*, Seymour E. Harris, ed., supplement to *Review of Economics and Statistics*, Cambridge, Mass., Harvard University Press, 1960, 42: 93–95, August 1960.

As already asserted, tax credits or deductions for parents or others who meet the expenses of students cannot be regarded as an improvement of the definition of taxable income. Granted that certain educational expenditures should be considered an income-producing investment, general income tax principles indicate that the costs should be charged against the yield over the life of the investment. Credits or deductions to parents are inconsistent with these principles because they apply to the tax liability or income of the parents rather than to the investment yield in the form of students' earnings. Neither the Internal Revenue Code nor popular opinion treats parents and their adult sons and daughters as a single economic unit. A second criticism of credits or deductions to parents is that the tax relief would accrue before the receipt of the investment income. A less fundamental objection is that nearly all of the proposals that have received public attention have been limited to college and university expenses and would therefore discriminate against other kinds of training. This defect could be eliminated by broadening the credit or deduction.

The proposals for credits or deductions to parents are intended to subsidize and encourage socially meritorious activity. For this reason, questions about the efficacy of the plans in stimulating additional expenditures, the distribution of benefits among income classes, and the needs of beneficiaries are more pertinent to these plans than to the proposals for refining the definition of income by allowing students to write off certain educational expenditures.[32] A deduction or tax credit granted to parents can be justified only on the grounds that educational expenditures are more meritorious or more burdensome than other socially desirable expenditures that do not receive special tax treatment. It is also necessary to argue that tax relief is more efficient or otherwise more acceptable than additional Government expenditures as a means of encouraging education. Some such considerations seem to underlie the approval of deductions for charitable contributions, and several personal deductions have been attacked for failure to conform to similar standards. Deductions that are recognized as necessary for the computation of net income, on the other hand, are not usually expected to meet such exacting requirements.

The difference between a current deduction or credit to parents and a deferred deduction to students may not seem important to most of those who are eager to do something to help education.

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[32] C. Harry Kahn. *Personal Deductions in the Federal Income Tax.* Princeton, N.J., Princeton University Press, 1960. p. 15–16.

Although the general public can hardly be expected to be as concerned as tax experts are with refinements of income concepts, the public should recognize that there are important advantages in adhering to the general principles of the income tax. These principles set up a desirable bulwark against erosion of the tax base. Many of our difficulties and discontent with the income tax can be attributed to the lack of adherence to a logical and consistent definition of income. Modification of the income tax for the purpose of subsidizing a desirable activity invites proposals for more questionable tax subsidies.

No great difficulties of administration or compliance would be involved in the tax credit or deduction plans if they were restricted, as is usually suggested, to tuition and fees and perhaps a few other designated expenditures of full-time students at recognized colleges and universities. If an effort were made to extend the plans to expenditures for part-time studies and for courses at trade schools and other institutions, many of the same difficulties would be encountered as under the amortization and deduction plans discussed in a preceding section of this chapter. The same marginal distinctions between eligible and ineligible expenditures would have to be made. Any plan providing current deductions or credits would have one administrative advantage over the amortization plans: it would not require the maintenance of accounts for individual taxpayers over a long period of years. This advantage may become less significant with the installation of automatic data-processing systems by the Internal Revenue Service.

V. Conclusion

More liberal deductions and amortization allowances for educational expenditures can be supported as a refinement of the income tax and as a means of encouraging investment in education and entry into occupations requiring expensive education. Current and deferred deductions for students pursuing education that increases their earning capacity are consistent with income tax principles, whereas deductions or tax credits for parents of students must be regarded as a special subsidy or incentive device. The design and administration of an acceptable scheme of current deduction and long-term amortization of educational costs would be difficult but does not seem impossible. The case for modification of the income tax would become stronger if tuition charges were raised to cover a larger fraction of college and university instructional costs. Even in those circumstances, forgone earnings, an item which could not properly be amortized, would be the major component of the costs of education beyond the high-school level. It seems unlikely that the adoption of a tax amortization plan would greatly influence educational expenditures. Nevertheless, the recognition for tax purposes that certain educational expenditures are investments would help establish an important principle that is often overlooked. Further study and public discussion of the subject are desirable.

CHAPTER 18

Research and the Financing of Higher Education

Herbert H. Rosenberg*

LAST YEAR the Nation spent about $1.4 billion for research in institutions of higher education—an increase of $300 million over the $1.1 billion level of 1960 (table 1). This represents $1 out of every $5 spent for higher education in 1960, as compared with $1 out of $10 in 1950 and $1 out of $25 in 1940. Between 1930 and 1960, expenditures for research increased 5.5 times as rapidly as total expenditures by colleges and universities. This trend clearly indicates the mounting significance of research in the financing of higher education.

Higher education in the United States has been defined as "that convenient abstraction which permits one to deal coherently with not far from 2,000 institutions of learning, diverse in character and involving millions of people engaged in a bewildering variety of activities."[1] This abstraction is not, however, very convenient for appraising the impact of research upon the financing of higher education because 186 universities and technological schools—less than 10 percent of the 2,000 institutions—consistently account for 97 percent of the research funds.

Research activities do not now affect in any major or direct sense the financing of other equally vital institutions—liberal arts colleges, teachers colleges, theological and other professional schools, junior colleges, and technical schools. *But research does play a powerful role, sometimes the dominant one, in financing the activities of the 186 universities and technological schools. These institutions award more than one-half of all the bachelor's degrees granted in this country and constitute the Nation's main resources for graduate and professional training. In these institutions, research influences the intellectual climate of graduate and undergraduate education, the character of physical facilities, the size, composition, and ambitions of the faculty, the nature of instruction, the aspira-*

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*Chief of the Resources Analysis Section, Office of Program Planning, National Institutes of Health.

[1] National Manpower Council, ***Education and Manpower***, Henry David, ed. New York, Columbia University Press, 1960. p. 290.

tions of students; it affects significantly the financing of all their other educational activities.

Someone has likened reading Proust to peeling the successive layers of an onion. In this chapter I intend to peel away the gross impressions derived from aggregate data and qualitative speculations in order to describe the impact of sponsored research upon the financing of higher education.

TABLE 1.—Expenditures of institutions of higher education: total, for educational and general purposes, and for organized research, selected years, 1930–60

Year	Expenditures in millions			Organized research as percent of—	
	Total [1]	Educational and general	Organized research	Total	Educational and general
1930	$518.5	$378.1	$18.1	3.5	4.8
1940	678.6	525.5	28.1	4.1	5.4
1950	2,260.0	1,717.9	227.3	10.1	13.2
1952	2,466.2	1,933.6	317.4	12.9	16.4
1954	2,902.5	2,288.4	[illegible]	12.9	16.4
1956	3,524.7	2,788.8	505.1	14.3	18.1
1958	4,544.6	3,634.1	733.9	16.1	20.2
1960 (estimate)	[2] 5,700.0	[2] 4,500.0	[3] 1,100.0	19.3	24.4
1961 (estimate)			[3] 1,400.0		
Ratio 1960/1930	11:1	12:1	60:1	5:1	5:1

[1] In addition to educational and general expenditures, includes student aid expenditures, other current expenditures, and expenditures for auxiliary enterprises.

[2] Author's estimate, taking into account the increase in expenditures for organized research and the growth curve for total expenditures between 1952 and 1958.

[3] Author's estimate, computed from data on Federal support of research in universities (National Science Foundation, *Federal Funds for Science X*)—1960 actual $782.8 million, 1961 estimate $964.3 million—by assuming that the Federal share continues to approximate 70 percent of the total.

SOURCE: Data for 1930–58 for the aggregate United States from U.S. Department of Health, Education, and Welfare, Office of Education, *Biennial Survey of Education*. Data for 1960, author's estimates.

Growth of Research

As a component of university expenditures, research was of little consequence prior to World War II. In 1940, the institutions of higher education in the United States spent $28 million for organized research—5 percent of their total expenditures for educational and general purposes.[3]

For the three periods for which data from the Office of Education biennial surveys permit closer scrutiny by type of institution and control, 1953–54, 1955–56, 1957–58, it is evident that: (1) Universities and technological schools consistently account for about 97 percent of organized research expenditures by institutions of higher education; (2) the distribution of research funds among public and private universities closely approximates their numerical relationship, 81 public,

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[3] Expenditures for educational and general purposes do not include items such as student aid and auxiliary enterprises not directly relevant to financing educational activities, per se, and therefore provide a more appropriate base for comparison with expenditures for organized research than do total expenditures.

60 private; (3) the 21 private technological schools receive substantially more research funds than the 21 public ones; and (4) the proportion of expenditures for educational and general purposes devoted to research is largest for the technological schools, especially those privately controlled, and it is substantially larger for universities than for the remaining types of institutions (table 2).

TABLE 2.—Expenditures for organized research in institutions of higher education, by type and by control of institution, 1954, 1956, 1958

[Amounts in millions]

Type of institution	Expenditures for organized research						Organized research as percentage of educational and general expenditures		
	1954		1956		1958		1954 percent	1956 percent	1958 percent
	Amount	Percent	Amount	Percent	Amount	Percent			
Total	$374.9	100.0	$506.1	100.0	$733.9	100.0	16.4	18.1	20.2
Universities	302.3	81	422.8	84	600.6	82	22.3	24.5	27.0
Public (81)	184.6	49	264.3	52	381.4	52	--------	--------	--------
Private (60)	117.7	32	158.5	32	219.2	30	--------	--------	--------
Technological schools	57.2	15	67.2	13	107.6	15	33.0	37.4	41.3
Public (21)	8.0	2	2.2	--------	2.9	--------	--------	--------	--------
Private (21)	49.2	13	65.0	13	104.7	14	--------	--------	--------
All other	15.4	4	16.1	3	25.7	3	2.0	1.8	2.2

SOURCE: Resources Analysis Section, Office of Program Planning, National Institutes of Health: Special analysis of data reported by the U.S. Department of Health, Education, and Welfare, Office of Education, Biennial Survey of Education.

During this period of growth, research has expanded in two distinct patterns. One pattern is represented by the creation of large-scale, off-campus research centers wholly supported by the Federal Government and staffed almost exclusively with full-time researchers. About one-half of all the expenditures for organized research is concentrated in a few major research centers such as Los Alamos, the Jet Propulsion Laboratory, the Applied Physics Laboratory, and Argonne Laboratories, operated and managed as off-site installations by the University of California, California Institute of Technology, Johns Hopkins University, and the University of Chicago, respectively. These university-managed operations contribute significantly to the Nation's research effort. They do not, however, usually engage in the instruction of students or impinge upon the use of classroom and laboratory space.

The other pattern provides support for the work of individual faculty members, usually engaged in research part time, on campus, usually in the traditional departmental setting where graduate and postdoctoral training is tightly integrated into the warp and woof of the total research activity. This pattern also provides support for full-time research staff, generally in a departmental or research institute framework, and involves a substantial number of graduate students and postdoctoral research fellows. The distinction between the large-scale center operation and the faculty research pattern is not a matter of black and white; there is a substantial gray area where neither classification fits precisely. Nevertheless I have focused upon support of the research being carried on by individual faculty members and have excluded university-managed research centers from the first two sections of this analysis for two reasons: (1) Only a few of the leading educational institutions operate research centers, but almost all of the major institutions sponsor faculty research; and (2) faculty research affects the financing of virtually all departments and activities within a university—the recruitment, compensation, and retention of faculty; the utilization of facilities; and the instruction of students and the training of scientists.

In its quadrennial surveys the National Science Foundation identifies the support of research carried on by individual faculty members as "Separately Budgeted Research by Colleges and Universities, Proper." Expenditures for such research increased from $205.5 million in 1954 to $327.5 million in 1958—4 years ago (table 3). The number of institutions reporting such research jumped 75 percent between 1954 and 1958, while research expenditures rose 60 percent. Analysis by expenditure interval (table 4 and chart 1) shows: (1) Increasing concentration of research expenditures in fewer institutions: about 6.5 percent of the institutions accounted for 57 percent of the total in 1958 as compared with 45 percent in 1954; (2) growing participation by a much larger number of colleges and universities with modest expenditures for research: 48 percent of those reporting spent under $100,000 for research in 1958 as compared with 27 percent in 1954; and (3) substantial increase in the number of institutions with research expenditures exceeding $1 million and, in particular, in the number exceeding $5 million.

TABLE 3.—Expenditures for and number of institutions reporting separately budgeted research by colleges and universities, proper, 1954 and 1958 [1]

Item	1954 [2]	1958 [3]	Increase	
			Amount	Percent
Expenditures (in millions)	$205.5	$327.5	$122.0	60
Number of institutions reporting	173	302	129	75

[1] Excludes agricultural experiment stations and Federal contract research centers.

[2] National Science Foundation, *Scientific Research and Development in Colleges and Universities, Expenditures and Manpower, 1953-1954*, table 9, p. 33.

[3] National Science Foundation, "Funds for Research and Development in Colleges and Universities, Fiscal Year 1958, a Preliminary Report," *Reviews of Data on Research and Development*, No. 19, April 1960, table 2, p. 6.

CHART 1

TRENDS IN DISTRIBUTION OF SEPARATELY-BUDGETED R & D IN COLLEGES AND UNIVERSITIES PROPER, 1954-58:

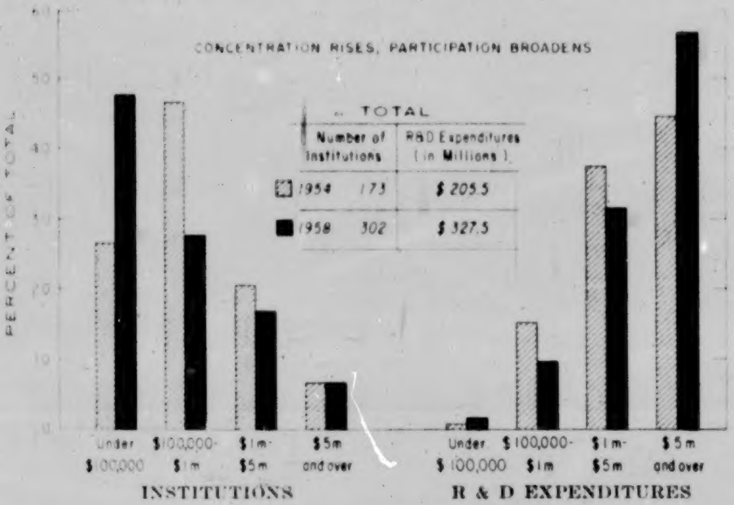


TABLE 4.—Expenditures by colleges and universities, proper, for separately budgeted research and development, by expenditure interval, 1954 and 1958 [1]

Research and development expenditure interval (in thousands)	Percentage distribution of—			
	Institutions		Research and development expenditures	
	1954 [2]	1958 [3]	1954 [2]	1958 [3]
Total	100.0	100.0	100.0	100.0
Under $100	26.6	47.7	.8	1.3
Under $10	10.4	8.3	.1	(4)
$10–$24		19.2		.3
$25–$99	16.2	20.2	.7	1.0
$100–$999	46.8	28.8	15.4	9.8
$100–$249	20.2	13.6	2.7	2.0
$250–$499	13.3	7.9	4.2	2.7
$500–$999	13.3	7.3	8.5	5.1
$1,000–$4,999	20.2	16.9	38.6	31.9
$1,000–$2,999	15.0	14.6	20.7	24.6
$3,000–$4,999	5.2	2.3	17.9	7.3
$5,000–over $10,000	6.4	6.6	45.2	57.0
$5,000–$9,999	6.4	4.6	45.2	30.4
$10,000 and over		2.0		26.6

[1] Excludes agricultural experiment stations and Federal-contract research centers.

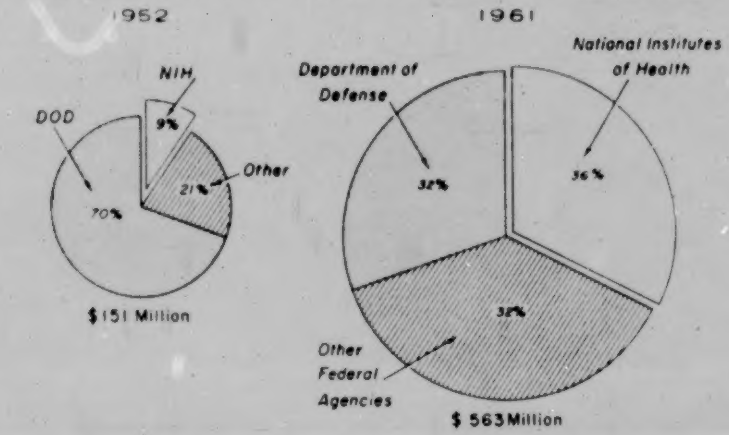
[2] Data from 173 institutions reporting $205.5 million expenditures for research and development; from National Science Foundation, *Scientific Research and Development in Colleges and Universities, Expenditures and Manpower, 1953–54*, table 9, p. 33.

[3] Data from 302 institutions reporting $327.5 million expenditures for research and development; from National Science Foundation, "Funds for Research and Development in Colleges and Universities, Fiscal Year 1958, a Preliminary Report," *Reviews of Data on Research and Development*, No. 19, April 1960, table 2, p. 6.

[4] Less than 0.1 percent.

CHART 2

TRENDS IN FEDERAL SUPPORT OF RESEARCH AT COLLEGES AND UNIVERSITIES, 1952-1961



Source: Derived from Federal Funds for Science, II & X, National Science Foundation, Washington, D.C.

Shift in Character and Composition of Federal Support

Between 1940 and 1952, Federal support of this research in institutions of higher education increased tenfold: from $15 million to over $150 million. In 1940 the Department of Agriculture provided the bulk of all Federal support for such research. In 1952, the academic community depended heavily upon the military agencies for sponsorship of research. Since 1952, this situation with respect to Federal support for faculty research has changed gradually—almost imperceptibly—as these facts show:

(1) Support by the military agencies has dropped from 70 percent to 32 percent of federally sponsored research in universities;[*]

(2) The nonmilitary agencies now support more than two-thirds of the total; and

(3) The National Institutes of Health has emerged as the leading Federal sponsor of university research; the National Institutes of Health and National Science Foundation together now provide nearly one-half of all Federal funds for separately budgeted research by colleges and universities, proper—meaning research by individual faculty members (table 5 and chart 2).

This radical but little-heralded shift in the composition of Federal agency support has been accompanied by an equally significant shift in the mechanism by which support is provided. Today the dominant mode of support is by grant rather than by contract. This change has influenced the character of review, the freedom of inquiry, and the stability of support. Research proposals are usually reviewed by the applicant's scientific peers, employing the criteria of scientific merit, promise, and feasibility. The terms and conditions of research grants have been liberalized to give the scientist greater freedom of inquiry. What is more important, most research grants now provide long-term support, assuring greater stability for the investigator and transforming "soft" into hard money for the institution.

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[*] This analysis is limited to support for faculty research. It excludes university-managed research centers such as those described earlier.

TABLE 5.—Federal support of separately budgeted research and development in colleges and universities, proper, by agency, selected years, 1952–61 [1]

Agency	1952	1954	1956	1958	1960	1961 (estimate) [2]
	AMOUNTS IN MILLIONS					
Total	$151.2	$140.9	$171.8	$282.3	$449.0	$563.3
Department of Defense	105.5	80.8	82.6	118.2	154.5	180.5
Atomic Energy Commission	13.4	16.4	18.3	30.2	33.6	46.2
Department of Health, Education, and Welfare	14.4	23.4	30.6	78.9	157.8	222.0
(National Institutes of Health)	(14.4)	(23.4)	(29.7)	(74.7)	(143.6)	(204.0)
Department of Agriculture	13.1	14.0	25.0	31.1	31.6	32.2
National Science Foundation	1.0	3.5	10.9	20.7	56.0	62.7
Other agencies	3.8	2.8	4.4	3.2	15.5	19.7
	PERCENTAGE DISTRIBUTION					
Total	100	100	100	100	100	100
Department of Defense	70	[illegible]	48	42	39	32
Atomic Energy Commission	9	12	11	11	8	8
Department of Health, Education, and Welfare	9	17	18	28	35	39
(National Institutes of Health)	(9)	(17)	(17)	(26)	(32)	(36)
Department of Agriculture	9	10	15	11	7	6
National Science Foundation	1	3	6	7	12	11
Other agencies	3	2	3	1	4	4

Detail may not add to 100 because of rounding.

[1] Excludes Federal contract research centers. Data from National Science Foundation, *Federal Funds for Science*, series.

[2] Estimate published in *Federal Funds for Science*.

Linked to these two changes has been a third development of equal significance. The agencies involved, their advisory groups, and congressional committees have taken the view that support of research in universities encompasses support for research facilities and the training of manpower for tomorrow's research. To implement this objective, the National Institutes of Health, the National Science Foundation, and other agencies have initiated manpower and facilities resources programs designed to strengthen the Nation's research structure and to increase its capabilities for future growth. Taken together, these three developments—the rising tide of civilian agency dominance, the swing from contracts to grants, and the initiation of substantial resource programs aimed at enlarging the supply and improving the quality of scientific manpower and providing research facilities and equipment—have exerted a profound influence upon the financing of higher education.

Impact

The general impact of research on the financing of higher education is self-evident. In some institutions the cost of this research represents more than half of the university's total budget. It accounts for over one-fourth of the Nation's expenditures for educational and general purposes in universities. But to determine the impact of research funds upon the financing of higher education, we must look behind these aggregates and examine their influence on costs, staffing, facilities, and students.

THE ISSUE OF PAYING FULL COSTS

Many university officials claim that the funds received for the support of research do not cover the full cost to the institutions of such activities.[4] To remedy this condition, universities have sought by negotiation with the military agencies to: (1) Obtain reimbursement for the full indirect costs, and (2) devise formulas which are now embodied in the "blue book" for establishing universitywide rates that would vary with the unique cost conditions at each institution. However, a new situation has arisen as National Institutes of Health and National Science Foundation research grants have become the dominant mode of Federal support for faculty research in universities. Such grants provide a flat rate for indirect costs as a percentage of total direct costs. This procedure differs from the military practice of paying a separately negotiated rate that varies from institution to institution.

The issue has shifted from reimbursement for indirect costs to reimbursement for the full costs, both direct and indirect, of grant-supported research. By and large, this issue has been answered in the affirmative insofar as the Federal Government is concerned, with the reservation that cost sharing is always subject to negotiation. I say "by and large" for these reasons:

(1) The House Appropriations Committee, unconvinced that a flat 15-percent rate is inadequate for indirect costs of research supported by the National Institutes of Health grants, has rejected proposals to raise that rate; and

(2) The National Science Foundation has consistently favored a flat rate for all grants instead of varying rates negotiated with each institution.

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[4] Admittedly, this statement oversimplifies a complex problem, which cannot be fully unraveled within the scope of this chapter.

The reservation of the House committee rests in part upon the knowledge that: (1) Funds for direct costs may be used to pay faculty salaries, including the institution's contribution to social security and other insurance and annuity plans; (2) title to equipment purchased for use on a research grant project is vested in the institution, and such equipment is likely to be used by many scientists and science graduate students not connected with the project; and (3) advance payments provide a tangible fringe benefit in the form of short-term investments. The reluctance of the committee is rooted deeply in the conviction that general aid constitutes a better solution for bridging the gap between income and expenditures than raising the indirect cost rate.

Thus, the issue ahead with respect to full costs is not *whether* they are to be paid by the Federal Government, but *how* they are to be determined and *how much* they may amount to. Approximations that are roughly equitable, administratively feasible, and politically acceptable may prove adequate. On the other hand, it may be necessary to resort to cost determination and negotiation procedures such as those currently applied to research contracts.

STAFFING

The terms and conditions of sponsored research in universities have influenced college and university staffing in a number of ways. They have—

(1) Attracted research-oriented scientists to academic careers, but predominantly in nontenure positions;
(2) Increased the number of faculty research staff far out of proportion to enrollment growth, especially at the graduate and professional levels;
(3) Reduced the teaching workload of individual faculty members;
(4) Increased the proportion of faculty time devoted to research as compared with teaching;
(5) Shifted a larger share of the salary burden to the sponsors of research, and especially to the Federal Government. (To some extent this is social bookkeeping pure and simple. To the extent that universities use this opportunity to expand their faculties, then each dollar of the institution's funds buys a larger quantity of total faculty effort);
(6) Enabled the institutions to cope more easily with the 6-percent annual increase in faculty salaries, especially where a rising proportion of science-faculty salaries is paid through research grants and contracts; the added costs are absorbed by a third party not involved in the negotiations; and
(7) Facilitated the recruitment of junior faculty members through subsidizing their period of postdoctoral training either through employment as research associates or more directly as postdoctoral research fellows.

Research has had a substantial impact in terms of the sheer number of university scientists and engineers engaged in this activity either part time or full time: between 1954 and 1958 the number of scientists and engineers (including graduate students in faculty research) rose from 43,315 to 61,635, a total increase of 40 percent and an average annual increase of approximately 4,500. (See table 6; to insure comparability, I have included graduate students employed as research assistants in the totals for both years because it is not possible to distinguish them within the aggregate for 1958). The number of faculty members engaged full time in research rose from 7,000 to 10,400—roughly a 50 percent increase—between 1954 and 1958.[6]

More significant than the sharp increase in faculty members engaged full time in research is the steadily rising proportion of faculty salaries paid from research funds. In 1958, the salaries of nearly three-fifths of all university scientists in research were paid from grant or contract funds, either wholly or partially, and more than one-third of them entirely from grant or contract budgets. The figures are given in table 7. Unfortunately, these data indiscriminately mix faculty with graduate students, and a further breakdown is unavailable at this time.

TABLE 6.—Scientists and engineers engaged in faculty research at colleges and universities, 1954 and 1958

Type of personnel	1954	1958 [1]	Increase	
			Number	Percent
Total	43,315	[2] 61,635	18,320	42
Scientific and professional personnel	[3] 31,455			
Graduate students	[4] 11,860			

[1] 1958 total: National Science Foundation, "Scientists and Engineers Engaged in Research and Development in Colleges and Universities, 1958, a Preliminary Report," *Reviews of Data on Research and Development*, No. 27, April 1961, table 3, p. 4.
[2] In 1958 graduate students engaged in research were included in the total but not identified separately.
[3] 1954 scientific and professional personnel from National Science Foundation, *Colleges and Universities, Expenditures and Manpower*, 1953-54, p. 62-63.
[4] 1954 graduate students: National Science Foundation, *Graduate Student Enrollment and Support in American Universities and Colleges*, 1954, p. 35.

TABLE 7.—Scientists and engineers engaged in research and development in 377 colleges and universities, by source of salary support, 1958 [1]

Source of salary support	Number	Percent
Total [2]	50,294	100.0
Entirely by grant or contract	17,565	34.9
Partly by grant or contract, and partly by institution	11,569	23.0
Entirely by institution	21,160	42.1

[1] National Science Foundation, "Scientists and Engineers Engaged in Research and Development in Colleges and Universities, 1958, a Preliminary Report," *Reviews of Data on Research and Development*, No. 27, April 1961, table 3, p. 4.
[2] Excludes Federal research centers and agricultural experiment stations.

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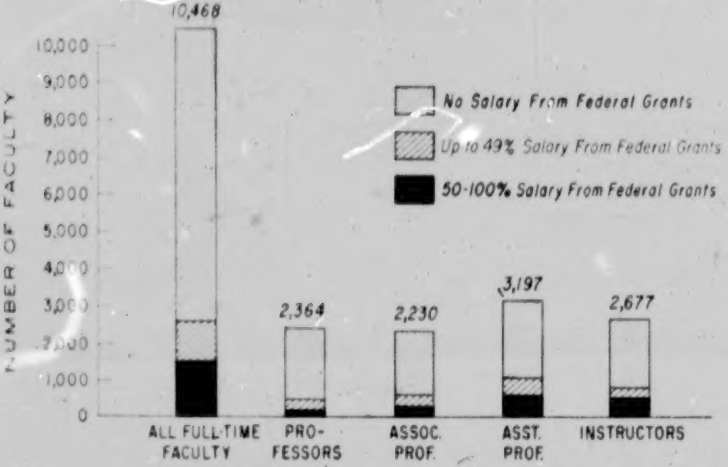
[6] National Science Foundation, "Scientists and Engineers Engaged in Research and Development in Colleges and Universities, 1958, a Preliminary Report," *Reviews of Data on Research and Development*, No. 27, April 1961.

CHART 3

NUMBER OF FULL-TIME MEDICAL SCHOOL FACULTY RECEIVING A PORTION OF THEIR SALARY FROM FEDERAL TRAINING AND/OR RESEARCH GRANTS



SOURCE: *Journal of American Medical Association*, Education Number, 1959-60, 174: 1442, Nov. 12, 1960.

Information for a breakdown of faculty and graduate students in research is available for medical schools. In the academic year, 1959–60, about 25 percent of the full-time faculty members in medical schools were paid partly through support from Federal research or training grants; more than 50 percent of the salary of roughly one out of every seven came from such sources (chart 3). These data indicate the average for all 85 medical schools taken together. Such an analysis does not differentiate between those institutions that paid faculty salaries from Federal grant funds and those that prohibited this practice. If the analysis were limited to the former group only, the proportion of faculty paid more than half their salaries from Federal grant funds would increase, perhaps substantially.

The wisdom and propriety of paying faculty salaries with research funds were touched upon only gingerly by the National Science Foundation in its 1958 report, *Government-University Relations*. However, in 1960 the Seaborg Panel of the President's Science Advisory Committee firmly grasped this nettle when it recommended that universities, as a matter of national policy, should "strengthen their faculties for both research and graduate teaching by accepting and using Federal as well as non-Federal support for faculty salaries." [6]

In the interim between the two reports, many institutions had already changed their policies with respect to payment of faculty salaries from grant or contract sources; others may be expected to follow their lead in the direction recommended by the Seaborg Panel. As a consequence, the continued availability of research funds for the payment of faculty salaries is crucial for budgetary planning in a steadily increasing number of institutions of higher education.

FACILITIES

As research activities have expanded and exerted pressure upon limited space, some institutions have responded to this space squeeze by allocating to research some space previously utilized for other activities.

In recent years this pressure has been alleviated—though by no means adequately—by the availability of matching funds for the construction of health research facilities and computer facilities, and the purchase of costly laboratory equipment. The Health Research Facilities program, for example, has awarded more than $180 million in Federal funds to universities since 1957. This program has resulted in capital expenditures of nearly $500 million for health research and related facilities, and assisted more than 300 academic and research institutions, in every State, in constructing or renovating approximately 20 million square feet of research space. Thus, every Federal dollar has stimulated the investment of nearly two non-Federal dollars. The construction of modern, well-equipped research facilities not only enables the institution to expand its research effort but also provides sorely needed space for graduate research training in the sciences.

On the one hand, the availability of matching funds for research facilities has channeled university building funds away from construction of new classroom space. On the other, this availability of funds has stimulated large-scale fundraising campaigns so that many institutions have been able to take advantage of the booster effect of matching funds. All in all, however, there can be little doubt that the university's building priorities have been strongly influenced and perhaps distorted because Federal matching funds have been available for research space but unavailable for classroom space.

STUDENTS

The rapid growth of research activities has generated fellowship and training programs designed to expand the supply of research scientists. These programs, which are inextricably linked to the support of research itself, have revolutionized the financing of graduate education. For the most able students in the sciences, graduate education is almost entirely subsidized. More than 30,000 graduate students in the sciences in 1960 were employed as research assistants on projects supported by Federal grants or contracts.[7] About 5,000 full-time predoctoral students in selected science fields were receiving stipends through fellowships and under training grant programs at 80 leading schools.[8]

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[6] The President's Science Advisory Committee, *Scientific Progress, Universities and the Federal Government*, 1960, p. 23.

These programs have—

(1) Relieved universities of a substantial burden of support of graduate students;

(2) Released funds that can be allocated to support students in nonscience fields;

(3) Accelerated the flow of students through graduate training and thereby expanded the supply sooner than it could have been expanded without such support; and

(4) Provided in some programs a cost-of-education allowance paid to the institution, and thereby directly aided the university in financing its graduate training programs.

IMPLICATIONS

Available data indicate that federally sponsored research programs have brought tremendous benefits to universities and technological schools in terms of staff, facilities, students, and fringe benefits, and that such programs now constitute a vital form of aid to higher education. However, it must be noted that research has been purchased by the military agencies as a service or commodity—not to aid higher education, but rather to utilize the most competent suppliers. Similarly, research of interest to the sponsoring agencies has been supported on the basis of scientific merit or promise in the arena of national competition. Support of research in higher education strictly on the basis of competence or merit has avoided the issues of racial discrimination and religious preference that have stymied nearly all attempts to provide general Federal aid to higher education.

There are many indications that Federal agencies have dropped their laissez faire attitude toward the effect of Federal sponsorship of research upon higher education. Civilian agencies such as the National Institutes of Health and the National Science Foundation have become increasingly concerned with the "university as a whole" and with the total effect of Federal research programs upon the structure, character, and financing of higher education. We can understand their concern if we consider the probable future growth of research in higher education and the problems that will very likely result from it.

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[7] *Budget of the United States Government for Fiscal Year 1961, Special Analysis of Federal Research and Development Programs*, p. 10.

[8] U.S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, "Trends in Graduate Enrollment and Ph. D. Output in Selected Science Fields at 80 Leading Schools, 1959-60 and 1960-61." *Resources Analysis Memo*, No. 3, June 1961.

PROJECTION FOR 1970

This projection treats higher education as a sector of the research economy. Hence, it includes research in university-managed research centers as well as the type of faculty research which has been the main focus of the preceding discussion in this chapter. A 1970 projection of \$3.5-\$4.0 billion for such research expenditures by institutions of higher education seems reasonable. The projection is limited to current expenditures for research. It does *not* include outlays for research plant and equipment or the costs of research training, both of which are classified as capital expenditures for research resources.

The 1970 projection has been developed by assuming that (1) the Nation's expenditures for research and development will continue to rise as a percentage of the gross national product; (2) the proportion of higher education's expenditures going to research and development will increase slightly, from 9 to 10 percent of the total; and (3) expenditures for research in higher education will continue to grow at the rate of \$250 to \$300 million annually, whether or not total expenditures for research and development grow as rapidly as my projections indicate.

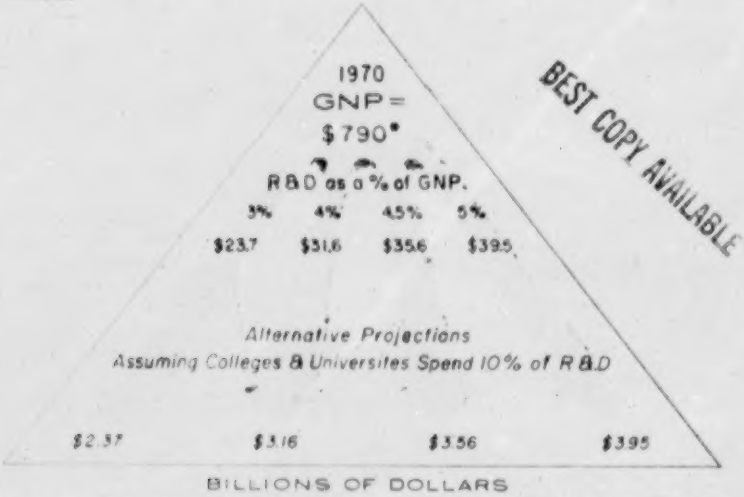
Such projections are useful in establishing probable ranges of expenditures in terms of general orders of magnitude; they are essential in appraising the potential impact of research upon the financing of higher education in the decade ahead. Inevitably, such projections draw upon past experience, take account of prevailing trends, and then reflect the judgment and the bias of the person making the projection.

The Nation's total expenditures for research and development more than quadrupled during the fifties, from \$2.9 billion in 1950 to an estimated \$13.5 billion in 1960 (table 8). Expenditures for this research in institutions of higher education more than kept pace, rising from \$227 million to \$1.2 billion—an increase of 430 percent as compared with 365 percent for total research and development. College and university research expenditures fluctuated as a proportion of total research and development—hovering around 8 percent between 1950 and 1955, dropping to 6 percent in 1957, and then moving upward steadily to 8.9 percent in 1960.

Expenditures for research and development have increased steadily as a share of the gross national product, from 1.02 percent in 1950 to

CHART 4

ALTERNATIVE PROJECTIONS OF 1970 EXPENDITURES FOR R & D AND FOR RESEARCH IN COLLEGES AND UNIVERSITIES



*Based on Gerhard Colm's "Judgment" Model for 1970, National Planning Association, *Long Range Projections for Economic Growth*, Oct. 1959.

2.68 percent in 1960. Simple extrapolation of this 0.166 percent average annual increase would raise the research and development share to 4.34 percent by 1970. I have taken a more flexible approach by developing a range of projections, assuming that expenditures for research and development will approximate from 3 to 5 percent of the gross national product by 1970 (chart 4). For this purpose, I have used the $790 billion judgment model published by the National Planning Association. If gross national product stated in current prices reaches $880 billion by 1970, as suggested earlier in this volume, the upper range of the projection shown in chart 4 would rise roughly 10 percent to $4.4 billion. Application of the same projection technique suggests a range of $5.7 to $7.5 billion when carried forward to 1975.

National security needs provided the impelling force for the growth of research and development during the fifties. Consequently, I have assumed that any reduction in research and development expenditures for national security will be offset by increased expenditures in other areas such as space exploration, atmospheric sciences, oceanography, automation, protection against environmental hazards, and the development of new products for the civilian market. Admittedly, this assumption cannot easily be tested.[*]

We can, however, examine the feasibility of the derived projections, which assume that research expenditures by institutions of higher education will approximate 10 percent of the total. The ultra-low projection of $2.37 billion anticipates a doubling of college and university research expenditures in the next decade, in contrast to a fivefold expansion in the fifties; it would call for an average annual increment of $100 million as compared with the present increment of $250 million. For all practical purposes, both the ultra-low projection of $2.37 billion and the low projection of $3.16 billion are products of an arithmetical exercise. I regard them as outside the range of probability.

The high projection of $3.95 billion would require an increase of $2.8 billion, or an average annual increment of $280 million. Even if the Nation's total expenditures for research and development should expand less rapidly as a proportion of the gross national product than is projected, it seems likely that expenditures for research in institutions of higher education will continue to grow at the rate of $250 million to $300 million per year.

While I am personally inclined toward the probability of $4.0 billion or more for college and university research expenditures by 1970, a range of $3.5 to $4.0 billion takes into account the growing participation of more and more educational institutions in research, the continued expansion of research facilities, the future supply of manpower now in the graduate and postdoctoral research training pipeline, and the mounting attraction of research careers for the Nation's youth. Such a projection offers a feasible framework within which we can identify the issues likely to confront college and university presidents, faculty, and research staff, on the one hand, and Federal agencies with major investments in university research, on the other.

THE TASK AHEAD

Rapport between higher education officials and Federal administrators has greatly improved as they have recognized the bond between science policy and higher education. The national interest in research is firmly established. These considerations increase the Nation's ability to confront the issues posed by a continuing expansion of research.

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[*] My assumption differs, for example, from Dexter Keezer's as expressed in "The Outlook for Expenditures on Research and Development During the Next Decade," *American Economic Review*, 50: 355-367, May 1960. Keezer's estimate of $22.2 billion for total research and development expenditures in the United States in 1969 is strongly influenced by the assumption that defense research spending will decline and not be compensated for by increase in nondefense research.

TABLE 8.—Growth of gross national product and of expenditures for research and development in the Nation and in colleges and universities, 1950-60

Year	Gross national product,[1] Amount (in billions)	Expenditures for research and development			
		Total, national[2]		Colleges and universities[3]	
		Amount (in billions)	Percent of gross national product	Amount (in millions)	Percent of total national expenditure for research and development
1950	$284.6	$2.9	1.02	$227.3	7.8
1951	329.0	3.4	1.03	273.8	8.1
1952	347.0	3.8	1.10	320.4	8.4
1953	365.4	5.2	1.41	385.2	7.4
1954	363.1	5.6	1.55	450.0	8.0
1955	397.5	6.4	1.61	480.0	7.5
1956	419.2	8.5	2.02	530.0	6.2
1957	442.8	10.0	2.27	600.0	6.0
1958	444.5	11.2	2.51	735.0	6.6
1959	482.8	12.4	2.57	890.0	7.2
1960	504.4	14.0	2.78	1,100.0	7.9
Percentage increase, 1950-60	77.2	382.8	....	383.9	....

[1] Department of Commerce, *Survey of Current Business*, July 1, 1961.

[2] For years 1950-52 from Department of Defense, *The Growth of Scientific Research and Development*, 1953, for years 1953-59 from National Science Foundation, "Funds for Research and Development in the United States, 1953-59," *Reviews of Data on Research and Development*, No. 16, December 1959, chart 2, p. 2, 1960, National Science Foundation, "Funds for Performance of Research and Development in American Industry, 1960," *Review of Data on Research and Development*, No. 30, September 1961.

[3] For years 1950 and 1952 from U.S. Department of Health, Education, and Welfare, Office of Education, *Statistics of Higher Education*, ch. 4, sec. II, 1951 and 1953 derived from straight line projection based on data from 1950, 1952, and 1954, 1954-58, National Science Foundation, "Funds for Research and Development to Colleges and Universities, Fiscal Year 1958," *Reviews of Data on Research and Development*, No. 19, April 1960, table 1, p. 3, 1959 and 1960, author's estimates.

FULL COST

Payment for the full cost of research by sponsoring agencies is the immediate bread-and-butter issue that dominates the attention of college and university business officers. The more pressing problem, however, is how to bridge the gap between the mounting costs of higher education and the revenues received from research and all other sources. Higher indirect cost rates will help, but I strongly believe that action taken on other issues inherent in the expansion of research will alleviate the situation sooner and more effectively.

MORE GENERAL SUPPORT FOR PROGRAMS AND INSTITUTIONS

Support for individual project applications on the basis of scientific merit without reference to institutional considerations has developed a top quality *national* research program. However, exclusive reliance upon the project system has engendered some problems with respect to the optimum development of research in colleges and universities. To overcome these problems, several Federal agencies have moved toward new and less restrictive forms of research support, bearing in mind the President's Science Advisory Committee's admonition that: "Not only the Nation's security, but its long-term health and economic welfare, the excellence of its scientific life, and quality of American higher education are now fatefully bound up with the care and thoughtfulness with which the Government supports research."[10]

These new forms of support provide general assistance to programs and institutions in a variety of ways: (1) training grants, (2) program grants, (3) institutional grants, and (4) general research support grants.

The training grants, for example, provide general support for research training in specific fields of science. These grants, awarded to academic departments, include provision for faculty salaries, equipment, supplies, and stipends for graduate and postdoctoral students. Training grants invest in academic strength at the point of maximum leverage in the sense that the faculty transmits knowledge, instills competence, and evokes the spirit of inquiry that must provide the essential foundation for research training. A strengthened university department not only gives better research training today, but will also be better prepared to take larger numbers of graduate and professional students in the future and to give them better training than it would otherwise be able to. In this connection, the Seaborg Panel took note of the successful pioneering experience of the National Institutes of Health and urged both the Government and the universities to take energetic action to broaden the scope of training programs.

Program grants are another mode of more general support for research in a broad field of science or a problem area. These grants have been made, for example, to biology departments and to centers for the study of aging. Such grants may also arise from the packaging of individual projects that have been awarded on a piecemeal basis over time and have come to constitute a coherent, integrated program of research. Program grants provide a broader, more flexible basis of support than grants for separate research projects and reduce the administrative minutiae encumbering both the sponsor and the institution.

Perhaps more significant than either of these two is the movement toward institutional grants and general research support grants. This movement recognizes that—(1) institutions have encountered difficulty in maintaining control over the content, emphasis, and direction of their research and training activities; (2) lacking any significant amount of unrestricted money for research, some schools attempt to expand in areas where funds are readily available, while other problems of a less dramatic nature but of no less scientific significance have been given lesser priority; (3) strong departments with out-standing researchers attract grant support and grow stronger, while weak departments experience greater difficulty in obtaining research support that could give them the necessary impetus for improvement.

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[10] The President's Science Advisory Committee, *Strengthening American Science*, 1958, p. 2.

The real issue is not that restriction of Federal funds to certain areas has caused some schools to develop programs that they do not want. It is, rather, that there is a lack of financial resources to develop equally important activities that may be of less interest to Federal agencies, but which the dean, faculty, and research staff know would give greater balance and direction to their research and training programs. In response to this need for more general support, the National Science Foundation has initiated an institutional grant program aimed at strengthening the scientific potential of colleges and universities receiving research grants from the Foundation. The National Institutes of Health is authorized by Public Law 86-798 to set aside an amount not exceeding 15 percent of its research project funds to be used for grants in aid for the general support of research and research training in the sciences related to health. Under this authorization, NIH has awarded general research support grants to strengthen research and research training capabilities of institutions of higher education and other nonprofit research organizations.

In the early years, these two general support programs will provide substantial fluid funds—$40 to $50 million in fiscal year 1963—for universities with large-scale research programs, but only "bootstrap" money for lesser institutions, because the procedures currently governing the amounts to be awarded to eligible institutions are closely geared to the level of current research activity. In subsequent years, however, as the total amount available rises, grants for the general support of research and research training may well become one of the more significant forms of aid to higher education. Each of these new developments illustrates the significant strides that have already been taken toward meeting the need for more general support of research in institutions of higher education.

Scientific merit—the criterion of excellence—governs today's decisions to support university research. If the projected expansion of research in the university sector is to be realized, many new centers of excellence must be developed. To some extent this development will take place in the natural course of events as weaker institutions are enabled to provide opportunities for topflight teachers and scientists and their younger proteges, who in turn will attract better students.

However, the Nation can ill afford to leave this critical transition entirely to the forces of the marketplace. No Federal agency now has a mandate to facilitate either the upgrading of faculties, buildings, and equipment of weaker institutions or the creation of new ones. This *constitutes a serious gap in national policy which must be bridged if we are to provide positive support for existing institutions with potential and to foster the creation and development of new centers of excellence and research competence—especially in the more rapidly growing regions of the country.*

EXPANSION OF THE RESOURCE BASE

Achievement of a $4 billion college and university research effort by 1970 will demand substantial expansion of the Nation's facilities and trained manpower for research. Fortunately, the device of matching grants has proved its worth as an incentive to encourage timely construction of needed research facilities at colleges and universities. Applications for such assistance, however, clearly indicate the need for wider latitude for matching requirements, for more nearly adequate authorization, and for longer range planning. The prevailing 50–50 matching ratio now imposes severe burdens on the less affluent schools and States, and often diverts funds from construction of educational facilities. This drain upon institutional finances will be reduced as matching requirements are modified and the inseparable relation between research and research training is recognized.

The matching incentive, however, is not appropriate for financing costly, highly specialized facilities, constructed and operated in the national interest. Such facilities, adequate for sustained and complex research activities, are becoming increasingly strategic for the advancement of science in an ever-widening range of fields. Although these facilities are utilized by university scientists and contribute to graduate and postdoctoral training, they are wholly financed by the Federal Government and, in all likelihood, will continue to be so financed.

With respect to the expansion of manpower resources, the outlook is generally favorable. There are abundant opportunities for careers in research. However, it will probably be necessary to modify existing mechanisms for the support of fellowship and training programs in order to provide a more nearly adequate and flexible framework for expanded activities at the graduate and postdoctoral levels. Moreover, the potential pool of talented youth for research (and for all other intellectual endeavors) could be dramatically expanded if the incentives and opportunities now available for graduate education were extended to the undergraduate level.

MORE SPECIALIZED ORGANIZATION OF RESEARCH ACTIVITY

Universities have sought to encourage research as a necessary and fruitful complement to teaching by encompassing it within the academic departmental structure. However, as the volume of research expands, it behooves universities and their sponsors to take full cognizance of the emergence of research as a full-time, highly specialized activity. Nearly a decade ago, the president of the Massachusetts Institute of Technology cogently stated the need to evolve new organizational arrangements for research that would foster optimum utilization of scarce talent and costly facilities:

> We would be lacking in our responsibility if we were to fail to push the organization of scientific research to its ultimate conclusion. This road apparently leads to larger laboratories, a growing costliness of facilities, and an increasing need for the planning of programs.
>
> There is a basic incompatibility between the true spirit of a university and those elements of management which tend to creep into the organization of projects, the planning of programs, and the utilization of costly facilities. One must recognize that there may be an ultimate need to establish central institutions to supplement the universities in fundamental research . . . . If we strive to contain the widening scope of research entirely within our large universities, we shall end by changing their character and purpose. In so doing, we shall render the greatest possible disservice to the cause of research itself.[11]

This problem will become acute in the years ahead. In some cases, the best solution will be to establish research institutes affiliated with universities or research centers operated by groups of universities; in other cases, to establish independent research organizations outside the academic environment. I cannot agree with those who counsel universities not to regard such institutes as competitors; they will compete for funds, talent, facilities, and recognition of excellence. The real challenge is how to develop research institutes that on balance will complement, not weaken, the Nation's structure for higher education.

FEDERAL POLICY

We are witnessing a basic transition in the role of the Federal Government in the advancement of research in higher education. Moving from a limited base of operations concerned with project-type research support for individual scientists, the Federal Government is undertaking a more difficult role aimed at bringing into being a new concept and framework for the support of university research in the years ahead. This more creative role involves anticipation of future needs, stimulation and development of research resources essential to future growth, concern with terms and conditions that increase the vigor of institutions and foster the freedom and productivity of investigators, and expansion of international research activities in consonance with the National interest.

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[11] J. A. Stratton. Research and the University. *Chemical and Engineering News*, 31: 2582, June 22, 1953.

In this new role, the Federal Government will have to—

> (1) Reconcile the virtues of diversity of sources of Federal support and multiplicity of programs with the growing necessity for central policy direction and control of Federal programs within the executive branch;
>
> (2) Develop mechanisms that will provide a continuing, effective appraisal of the total impact of research upon all major aspects of higher education, including financing;
>
> (3) Provide a focal point where universities can present their total needs and resources;
>
> (4) Develop a method of communication whereby all institutions of higher education may be informed about the status and prospects of all Federal programs directly involving the academic community.

I shall not labor the first three points concerning which there is sufficient consensus to permit me to assume they have become self-evident propositions. With respect to the issue of systematic communication, it has been said that—

> To realize the possibilities for Federal support, a university needs—and a small college cannot afford one—a full-time specialist in Washington, perhaps more than one, who has entries into a dozen or more agencies. The university lacking such a ubiquitous figure is not represented as a university.[13]

Although this view may exaggerate the situation, it is true that many institutions have been unable to keep abreast of rapidly evolving opportunities scattered among many agencies and spanning a wide variety of programs and mechanisms. To help cope with this problem, I would propose an annual assembly of university representatives and Federal officials. Such an assembly would: (1) enable Federal officials to brief university representatives on major new developments, and (2) provide each institution with an opportunity to obtain complete information on programs of special relevance to its interests and capabilities. The assembly perhaps might also convene in workshops, each devoted to a major topic; for example, facilities, cooperative studies, international programs, research centers. When compared with the potential benefits of improved communication, wiser choice, and more effective utilization of university research resources, the obstacles to staging such an enterprise seem small indeed.

GENERAL AID

Educational institutions desperately need new sources of support to meet steadily rising operating expenditures. Although federally sponsored research contributes a cash flow of considerable dimensions and has a crucial impact upon the financing of many institutions of higher learning, it is no substitute for general aid. However, as the Federal Government moves toward general aid, accumulated research experience is both relevant and reassuring. It has demonstrated that Federal funds can be provided without restricting the freedom of academic institutions.

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[13] The American Assembly. *The Federal Government and Higher Education*. New York, Columbia University Press, 1960, p. 161.

CHAPTER 19

Financing Higher Education in the United States and in Great Britain

Dennis S. Lees[*]

THE DEMAND for higher education is rising sharply. In the United States total college and university enrollments rose from 1.5 million in the academic year 1938–39 to 3.5 million in 1958–59, and are estimated to rise to 7 million by 1970. In Great Britain enrollment in universities alone doubled to 100,000 in the 20 years before 1958–59 and may rise to 170,000 by the early seventies. In part this is a natural response to the postwar rise in birth rates, higher per capita real incomes, and increasing awareness of the payoff of college education in terms of increased earnings and status. But these factors are powerfully reinforced by a growing realization on the part of governments in the free world of the fundamental contribution of higher education to strong and growing economies. This gives urgency to the current quest of free societies to secure adequate resources for institutions of higher learning and that makes international comparisons of more than academic concern. Its most recent expression in Britain is the appointment of an official committee under the chairmanship of Lord Robbins, formerly professor of economics at the University of London, "to review the pattern of full-time higher education in Great Britain, and in the light of national needs and resources to advise Her Majesty's Government on what principles its long-term development should be based."

FINANCING EXPENDITURES: POSITION IN THE FIFTIES

It is a remarkable fact that there are in Britain no consolidated official statistics on higher education. The data are scattered in numerous published documents, both official and private, or tucked away in the files of governmental departments. To get anything like a complete picture would require a major piece of research, and this I have been unable to undertake. For the most part I shall be concerned with the universities.[1] As these account for over half of the total annual expenditure by institutions of higher learning and are the main focus for increasing student numbers over the next decade, it should be possible to identify the major differences in the financing of such institutions in the United States and Britain and to establish their broad significance.

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[*] Senior lecturer in economics, University College of North Staffordshire, England.

In 1958–59, the latest year for which adequate data are available, the number of students aged 18 and over in all institutions of higher learning was 3.5 million for the United States and 190,000 for Britain, representing 20 percent and 4 percent, respectively, of their young people aged 18 to 21 years.[2] From this point of view, Britain in that year was in the position held by the United States in 1920; and it had the smallest proportion of young people in institutions of higher learning in the major countries on either side of the Iron Curtain.[3] Differences in quality may narrow the gap somewhat but, with that taken into account, there can be no question that the quantum of higher education in the United States is far greater than in Britain.

The same can be seen for expenditure. Again in 1958–59, current expenditures of colleges and universities in the United States were approximately $4 billion, representing almost 1 percent of the gross national product, or $23 per head of the population. The corresponding figures for Britain were £112 million—representing 0.5 percent of the gross national product or rather more than £2 per head.[4] In other words, such institutions in the United States spent twice as much in proportion to its gross national product and four times as much in proportion of population[5] as did those in Britain.

There are marked differences between the two countries in the way this expenditure is financed. This can be seen from the table 1. For the United States the latest year for which complete data are published is 1957–58; this is compared with 1958–59 for Britain.

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[1] Twenty-one universities and three colleges. This greatly understates the number of institutions concerned. For example, Oxford is made up of 31 self-governing colleges, and Cambridge of 22. The University of London includes 33 self-governing colleges and 10 institutes directly controlled by the university. Institutions of higher education other than universities include 200 teacher training colleges, 8 colleges of advanced technology, 22 regional colleges of technology, and in addition almost 500 other recognized institutions of higher education, which vary considerably in size and importance.

[2] The student population of British universities amounted to 100,000, of whom all but 10,000 were residents of Great Britain (Great Britain, Central Statistical Office, *Annual Abstract of Statistics*, 1960, table 124). The figure of 90,000 students in other institutions of higher learning is a necessarily rough estimate, converting what are mainly part-time courses into 3-year equivalent courses.

[3] See *The Economist*, London, 197 : 1211, Dec. 17, 1960.

[4] The methods of estimation of the British figure are indicated in table 4, notes and sources, given at the end of this chapter.

[5] At the current rate of exchange ($2.80), British expenditure per head is approximately $6.

The major differences lie in the roles of students fees and governmental payments. In the United States a quarter of the institutions' income is derived from fees; in Britain, less than one-eighth. Payments by government at different levels make up slightly more than half of the institutions' income in the United States as compared with over two-thirds in Britain.

TABLE 1.—Percentage distribution of current income [1] of institutions of higher learning in United States and Great Britain, by source

Source of income	United States,[2] 1957-58	Great Britain,[3] 1958-59
All sources	100.0	100.0
Student fees	25.0	12.3
Government:		
National	18.9	67.1
State	30.7	
Local	3.4	2.6
Endowments, etc	13.5	8.0
Other	8.5	10.0

[1] Represents income sources for all educational and general purposes and is not limited to income for student higher education.

[2] U.S. Department of Health, Education, and Welfare, Office of Education, Biennial Survey of Education data for 1957-58.

[3] Great Britain. University Grants Committee: *Returns from Universities and University Colleges in Receipt of Treasury Grant, Academic Years, 1958-59.* London, Her Majesty's Stationery Office (Cmnd. 1106, 1960, table II), amounts reported plus author's estimates for colleges at Oxford and Cambridge Universities.

The contrast becomes even sharper if we exclude the Oxford and Cambridge colleges (as distinct from the universities), whose income is derived solely from fees and endowments. Student fees in Britain then fall to one-ninth of the institutions' income, and governmental payments rise to nearly three-quarters. Endowments fall from 8 percent to under 5 percent, compared with 13.5 percent in the United States. Furthermore, these proportions are virtually uniform for all the universities. Except for Oxford and Cambridge, no university depends on student fees for more than 16 percent of its income, nor on endowments for more than 9 percent, nor on governmental payments for less than two-thirds. In the United States, on the other hand—

> For 1,025 privately sponsored colleges and universities, it is estimated that in the academic year 1957-58, student charges provided 46 percent of educational income. For 364 publicly sponsored colleges and universities, the proportion of income for educational purposes obtained from student charges has been estimated at 8 percent.[6]

The variation in governmental payments for operational budgets can be inferred from the fact that less than 4 percent of such payments goes to private institutions.[7] Thus, although British universities are private, autonomous institutions, all but the Oxford and Cambridge colleges resemble U.S. public institutions of higher learning in their sources of finance. How, in spite of this, they retain their independence of governmental control is an issue to which we shall turn in a moment.

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[6] John D. Millett. "The Role of Student Charges," in *Financing Higher Education, 1960-70*, Dexter M. Keezer, *ed.* New York, McGraw-Hill Book Co., 1959. p. 162.

[7] W. Homer Turner. "The Prospects for Private-Sector Support of Higher Education," in ibid., p. 244

This extremely heavy reliance by British universities on governmental payments is a post-1945 development. As table 2 shows, in prewar years fees and endowments together provided over 50 percent of the universities' income, with governmental payments constant around one-third. Since 1945 the position has been revolutionized, with governmental payments rising to two-thirds of income in 1959 and fees and endowments falling to less than a quarter. Further, the Central Government now accounts for virtually all governmental payments, whereas before the war its share was less than four-fifths.

There has been a similiar trend, though far less marked, in the United States. From 1929–30 to 1955–56, revenues from student fees fell from 30 percent to 25 percent and endowments from 20 percent to 16 percent; governmental support rose from 36 percent to 50 percent.[8] And a growing proportion of governmental support has come from the Federal Government, principally in payments for research. This last is the opposite of the position in Britain, where Central Government support takes the form of grants to meet operating expenses in general and where payments for research equal only 3 percent of university income as against 12 percent in the United States.

TABLE 2.—Percentage distribution of income of British universities, by source, specified academic years, 1924–25, to 1958–59 [1]

Source of income	1924–25	1934–35	1947–48	1954–55	1958–59
	PERCENTAGE DISTRIBUTION				
All sources	100.0	100.0	100.0	100.0	100.0
Student fees	28.3	30.9	22.2	13.5	12.3
Parliamentary grants	26.9	26.0	47.2	62.4	64.0
Local governments	8.9	7.3	4.2	3.2	2.6
Endowments, etc	26.6	22.8	13.8	8.7	8.0
Other income [2]	9.3	13.0	12.6	12.2	13.1
	AMOUNTS IN MILLIONS				
Total income (in pounds)	5.3	8.0	18.2	35.1	57.0

[1] For 1924–25 to 1954–55, years ended Mar. 31; for 1958–59, the year ended Sep. 30.
[2] Includes payments by central Government for research, amounting to £1.8 million in 1958–59.

Source: Data for 1924–25 to 1954–55 from John Vaizey, *The Costs of Education*, London, George Allen & Unwin, 1958, p. 200; 1958–59 source given in table 1, footnote 3, this chapter.

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[8] Robert D. Calkins. "Government Support of Higher Education," in *Financing of Higher Education, 1960–70*, Dexter M. Keezer, ed. New York, McGraw-Hill Book Co., 1959. p. 192.

FINANCING STUDENT MAINTENANCE AND FEES

The amount of public support in Britain is understated in table 2, as the figures do not report governmental payments to persons as distinct from institutions. In 1958-59, 79,000 resident British students were taking first-degree courses in the universities, and over three-quarters of these had received awards from public funds that paid full student fees.[9] Although fees differ somewhat as between universities, we shall not be far in error in assuming that three-quarters of the institutions' income from fees comes from public funds. This works out at roughly £5 million. Governmental payments to universities—directly or through student fees—in 1958-59 were made then as follows:[10]

Source of income	*Payments to universities (millions of pounds)*
Total	44.7
Central Government:	
Parliamentary grants	36.4
Payments for research	1.8
Local governments	1.5
Students fees paid from public funds	5.0

Since British universities' income is equal to their estimated expenditure of £57 million (see table 4 and notes), they as a whole are dependent on Government for almost four-fifths of their current income. When the figures for the Oxford and Cambridge colleges are excluded, this proportion rises to 85 percent, and for some universities it is over 90 percent.

The total cost to public funds of university awards in 1958-59 was £17 million.[11] Deducting the estimated £5 million for student fees, this leaves £12 million for maintenance. Any figure for annual maintenance costs of the 79,000 first-degree students must of necessity be a guess, but £300 per student seems reasonable, amounting to an annual total of £24 million.[12] Thus public funds bear something like half of student maintenance and 55 percent of maintenance and fees combined.

Likewise, the amount of payments to institutions in the United States understates the Federal Government's support for higher education. In 1957-58 these Federal payments for student education purposes are estimated at less than $100 million.[13] But Federal contributions for higher education excluding research are estimated at $616.4 million, of which $363.3 million originated in the Veterans' Administration and consisted largely of payments to veterans.[14] The proportion of this and other public funds that went for student fees is not known, but it is clear that, in the financing of students' maintenance and tuition expenses, the United States differs radically from Britain.

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[9] Great Britain. *Grants to Students*, Report of the Committee appointed by the Ministry of Education and the Secretary of State for Scotland in June 1958 (the "Anderson report"), London, Her Majesty's Stationery Office, Cmnd. 1051, May 1960, par. 311 and appendix 3.

[10] Great Britain, University Grants Committee, op. cit., table 11. Fees for universities, excluding Oxford and Cambridge colleges, amounted to £5.7 million. One and three-tenths million pounds has been added for Oxford and Cambridge colleges, making a total of £7 million. Three-quarters of this amounts roughly to £5 million.

[11] "Anderson report," op. cit., par. 11.

[12] The £300 is based on data on term-time maintenance grants, given in "Anderson report," op. cit., app. 9.

In 1959, 40 percent of U.S. college students' expenses came from family income, 20 percent from long-term family savings, 25 percent from part-time and summer earnings of students themselves, and the remaining 15 percent from scholarships, veteran benefits, and loans.[15]

It seems reasonable to suppose that a small proportion of student expenses came from public funds in the United States, compared with our estimate of 55 percent for Britain. The British proportion rises sharply beginning October 1961, when the parents' contribution to maintenance and tuition costs will be reduced and the governmental contribution correspondingly increased.[16]

FINANCING EXPENDITURE: OUTLOOK FOR THE SIXTIES

The requirements of higher education in the United States over the next decade and alternative methods of financing them have been widely discussed, and a brief summary is all that is necessary here. Enrollment is estimated to rise from 3.6 million in 1960–61 to 7 million in 1970–71. Current expenditures for student higher education are estimated to increase from the $2.4 billion level of 1957–58 to $9 billion, and total educational and general expenditures to increase to about $10 billion without inflation and to about $14 billion with a price rise. (See ch. 11 of this publication.)

There is wide disagreement on the best or most practicable ways of financing the increase in expenditure. This is brought out in table 3, which summarizes projections from four economists.

Harris, for example, argues for a steep increase in tuition fees, financed mainly by massive long-term loan programs. His grounds are practicability (sufficient finance cannot be expected from the other sources—governmental payments and private philanthropy) and equity (higher education is a form of investment in human beings which pays off in higher future incomes and is thus most appropriately financed by loans rather than grants). In his view, tuition fees will rise from 25 percent to 40 percent of the institutions' income, and governmental payments will fall.[17] Even so, the absolute amount of governmental contribution will more than double.

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[13] See ch. 11 of this publication.

[14] See ch. 13 of this publication.

[15] Devereux C. Josephs. College on Credit. *Think*, 25: 8, May 1959.

[16] Great Britain. *Parliamentary Debates* (Hansard). House of Commons Official Report, vol. 634, No. 50, Feb. 9, 1961. London, 1961, cols. 88–90.

TABLE 3.—Percentage distribution of income for educational and general purposes and for student higher education: United States, 1957-58, and projected 1969-70 and 1970-71

Source of income	1957-58		1969-70, educational and general			1970-71 student higher education [6]
	Educational and general [1]	Student higher education [2]	Harris [3]	Musgrave [4]	Calkins [5]	
All sources	100	100	100	100	100	100
Student fees	25	36	40	35	25	37
Federal Government	19	4	18	27	14	4
For research	14	....	13	5	3	....
For other purposes	5	4	5	22	11	4
State governments	31	42	17	19	39	41
Local governments	3		2	2		
Endowments, etc	14	15	11	12	13	15
Other income	8	3	12	5	9	3

[1] U.S. Department of Health, Education, and Welfare, Office of Education, Biennial Survey of Education, data for 1957-58.

[2] Based on ch. 11 of this publication.

[3] Seymour E. Harris. "Financing Higher Education, Broad Issues" in *Financing Higher Education 1960-70*, Dexter M. Keezer, ed. New York, McGraw-Hill Book Co., 1959, table 9, p. 72.

[4] Robert D. Calkins. "Government Support of Higher Education," ibid., table 3, p. 197.

[5] Richard A. Musgrave. "Higher Education and the Federal Budget." *Review of Economics and Statistics*, 42: 98 (Sup. August 1960, pt. 2).

[6] Derived from data used in ch. 11 of this publication, and based on percentage distribution of first approximation of income, illustration I.

Musgrave also expects fees to provide a larger share of income (though he does not expect so large an increase as does Harris) on the grounds that "Not only will rising family incomes be available to pay for tuition, but a growing awareness of the profit of higher education may be expected to increase the parents' willingness to contribute."[18] In contrast to Harris, he expects the governmental share to remain roughly constant, with a sharp tendency for the share of the Federal Government to increase. Again differing from Harris, he expects the bulk of the increased Federal support to be in the form of contributions to general operating expenses rather than payments for research.

Calkins, on the other hand, is at odds with Harris (and by inference with Musgrave) in assuming that student fees need do no more

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[17] Seymour E. Harris. "Financing of Higher Education: Broad Issues," in *Financing Higher Education, 1960-70*, Dexter M. Keezer, ed. New York, McGraw-Hill Book Co., 1959. p. 35-78.

[18] Richard A. Musgrave. "Higher Education and the Federal Budget." *Review of Economics and Statistics*, 42: 98. (Sup. August 1960, pt. 2.)

than maintain their share of the institutions' income. "Professor Harris," he says, "assumes tuition increases for private institutions that are higher than will be necessary or likely, if present forms of public support are continued and his assumed tuition increases for public institutions are higher than seem to be feasible or probable in view of the low charge tradition of many of these institutions." [19] He differs again with Harris in assuming both that the share of the Federal Government will fall (though biased more in favor of general contributions rather than research) and that the share of State and local governments will rise.[20] Indeed, the only settled point in the controversy seems to be that income from endowment will double over the next decade and will do rather less than keep pace with rising expenditure.

The projections of expenditures for student higher education assume that income from the various sources will expand roughly in proportion to previous income, with the substantial proportion of needed additional funds being supplied from the other sources, public and private.[21]

Harris, Musgrave, and Calkins emphasize the need for growing Federal support of a general kind for higher education. The obstacles in the way are set out by Musgrave:

> . . . Federal aid to education involves collateral issues of a highly controversial sort. These include concern over infringements of centralized direction on educational freedom and with it the States' rights issue. There is a fear that Federal aid be made contingent on compliance with policies for racial integration. . . . People are aware that publicly financed education will be supported by more or less progressive taxes if the finance is Federal, and by more or less regressive taxes if the finance is State and local. Hence, questions of income distribution are involved. Also, there is a further aspect of redistribution between high- and low-income States. And last but not least, there is a question of how Federal aid will affect the relative positions of public and private institutions.[22]

To the extent that obstacles to Federal aid to colleges and universities prevent an adequate flow of such aid, tuition fees will need to be increased further. As the increase is likely to be more pronounced in private than in public institutions, the effect will be to divert more students to public institutions, thus aggravating the problem of State governmental support.

Britain avoids most of these problems through its unitary constitution and a responsibility for higher education placed firmly in the hands of the Central Government. There is not, as yet at least, much in the way of real competition between the private universities and public institutions such as technical colleges. And the threat to the independence of the universities that is implicit in their heavy and growing dependence on central funds has so far been averted by an institution unique even in Britain itself, the University Grants Committee.

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[19] Robert D. Calkins. "Government Support of Higher Education," in *Financing of Higher Education, 1960-70*, op. cit., p. 196.

[20] Ibid., p. 183-219.

[21] See projections by Selma J. Mushkin in ch. 11 of this publication.

[22] Richard A. Musgrave, op. cit., p. 100.

The "UGC," as it is known, acts as an intermediary between the Central Government and the universities. The 18 members of the committee are appointed by the Chancellor of the Exchequer. Somewhat more than half of these are university professors and the rest also are prominent figures in the academic or the business world. The committee is directly responsible to, and works closely with, the Treasury and advises the Chancellor concerning the financial needs of the universities. The Treasury and the universities have no direct contact with each other; communication takes place via the UGC. Likewise, government aid is channeled through the committee. Aid for operation of budget (recurrent grants) is based on a 5-year period and takes the form of general grants to the university. Within certain broad limits, agreed upon with the committee (for example, range of salary scales and staffing ratios), each university is then free to allocate the funds as it thinks fit. Aid for capital expansion (nonrecurrent grants) is agreed upon annually and, unlike the recurrent grants, is earmarked for specific purposes.[23]

The large postwar growth of parliamentary grants has sharpened the "inevitable conflict between the general desire to maintain the independence of the universities and the need for the exercise of proper financial control both by the University Grants Committee and by Parliament."[24] For the 10 years after 1946, the Public Accounts Committee was persistent in its efforts to induce the Treasury to open the books and accounts of the universities to inspection by the Comptroller and Auditor-General, in line with the practice in other institutions that received the greater part of their income from public funds.[25] This the Treasury successfully resisted on the grounds that—

> . . . the relationship between the Universities, on the one hand, and Parliament and the Government, on the other, was a very special one. The Treasury had never examined the universities' books and did not aim at detailed control. If the Comptroller were brought in, the Treasury would, before long, be compelled to expand their intervention in university

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[23] Nonrecurrent grants, with which we are not concerned in this paper, totaled £16.5 million in 1958-59.

[24] Great Britain, The Grant in Aid of Colleges and Universities, in the *Fifth Report from the Select Committee on Estimates*, Sess. 1951-52, House of Commons 163, London, 1952, par. 28.

[25] For a detailed account of this episode, see H. V. Wiseman, Parliament and the University Grants Committee, *Public Administration*, London, 34: 75-92, spring 1956.

> matters and to enlarge their control in a way which would certainly change and, the Treasury believed, be prejudicial to the present harmonious relationships between the universities and the UGC."[26]

And there for the time being the matter rests, with the committee functioning as successfully as ever. But we shall have cause to doubt in a moment whether even this remarkable administrative device will be capable of withstanding probable future strains.

Students in the United States are fortunate in having a plethora of estimates of future requirements about which to disagree. In Britain there are no estimates at all; in some way, to look ahead as far as 1970 is to be thought lacking in proper pragmatic spirit. The figures that follow are thus necessarily rough, though they should illuminate the major issues.

The Government's aim is to expand university enrollments from their present 100,000 to 170,000 (not including enrollments in other institutions) by 1970.[27] The financial implications would seem to be as follows: If cost per student remains constant, current expenditure by universities will rise from £57 million to £100 million. But salaries will need to rise sharply if a sufficient number of faculty of quality are to be recruited, and the emphasis on science courses will raise operating costs. It seems reasonable to assume that cost per student will increase by 50 percent (a similar assumption is being made in the United States), bringing total expenditure up to £150 million. This assumes no inflation; if prices rise, as they are likely to do, the expenditure will be so much greater.

How will this sum be financed? Let us assume provisionally that tuition fees will remain unchanged at their present average of £70 per student will produce £12 million in 1970. Endowments, and so forth, now amount to approximately £5 million and they have barely doubled since 1930 (compared with a more than fourfold increase in the United States), they are unlikely to do more than this in the next 10 years. Let us put them at £10 million by 1970. All other income, excepting governmental aid, will do well to maintain its present proportion of income and might reach £18 million in 1970. This leaves a gap to be filled by governmental aid of £110 million, or about triple the present amount of such aid. The great bulk of this would come from the Central Government. This means that over three-quarters of the universities' income would be derived from direct governmental aid, compared with two-thirds today. Payments for research and public support for student fees bring that proportion to over four-fifths. If the colleges at Oxford and Cambridge universities are excluded, the proportion of expenditure financed by Government approaches nine-tenths. For all practical purposes British universities would be wholly maintained out of tax-financed public funds and would be akin to schools and colleges financed directly by the Ministry of Education and local governments.

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[26] Ibid. p. 82.

[27] Great Britain. University Grants Committee. *Returns from Universities and University Colleges in Receipt of Treasury Grant, Academic year 1958–1959.* London, Her Majesty's Stationery Office, Cmnd. 1166, 1960, par. 7.

It is extremely doubtful if the independence of universities could survive these circumstances, or, from the constitutional point of view, whether it should do so. The curious mystique of the UGC, so successful up to now, may prove an inadequate shield. As we have seen, the Public Accounts Committee grew restive as parliamentary grants increased from their prewar level of £2 million to £27 million in 1955–56. Since then it has been quiescent while grants have been rising to £36 million. But it is difficult indeed to believe that it would not insist on detailed inquiry into the spending of well over £100 million of the taxpayers' money. From then on, detailed state control of university affairs would follow—and constitutionally should follow—as a matter of course. The deep-rooted forbearance of state interference with universities may hold this up for a time, but it is hard to see that it could be long delayed.

Nor would the pressures come solely from parliamentary concern with the proper use of public funds. There is a growing and articulate demand by the general public for a rapid expansion of university places to promote equality of opportunity, to diminish wasting of talent, and to lift Britain from the bottom of the list of wealthy nations. Even the expansion to 170,000 students by 1970 will provide a *university* education for only 3 percent of persons aged 18–21—little more than the 2.5 percent of today. Institutions almost wholly dependent on compulsory levies from persons making the demands are in no strong position to resist. At best, the *pace* of expansion will be out of their hands; at worst, a *type* of expansion may be forced upon them which they deeply believe to be against the long-run interests of the universities. Only the colleges of Oxford and Cambridge, secure with their fees and endowments, would be immune.

The obvious answer to this threat is to raise student fees. If the prewar share of 30 percent could be restored, the present need for Central Government aid would be cut from £36 million to £24 million, and the estimated need in 1970 from £110 million to £75 million. Although large in amount, this latter sum would represent no more than half of current income. Universities would then at least have more of a chance against parliamentary control. But, while this course is evidently feasible for the United States, it is not for Britain. The reason is that the bulk of the fees are themselves paid out of public funds.

> The amount received from this source [fees] has remained relatively stable because there has been no general change in the rates of fee in force during the period under review [1952 57]. In general, the universities would be glad to develop any source of income which would reduce their growing dependence on Treasury grants, but they have hesitated to vary rates of fee when the greater part of their fee income is derived from public funds . . .[8]

To raise fees in these circumstances is simply to replace one form of governmental aid by another. Thus the universities are in a cleft stick: governmental grants are high because fees are low, and fees are low because governmental grants are high.

There is general agreement that the independence of the universities should be preserved. It is in real danger of being lost through inappropriate methods of financing. New methods must be sought. The solution is to be found in a program of loans to students to replace the present system of tax-financed grants. Universities could then raise their fees to whatever level seemed appropriate. Dependence on the Treasury could be sharply reduced. The cleft stick would be broken.

This is an unusual argument for student loans as against grants and may well be peculiar to Britain. It strongly reinforces the more orthodox argument that a college education pays off in higher future income and is best regarded as a personal investment. The general principle was stated long ago by Adam Smith. One part of fixed capital, he said:

> . . . consists . . . of the acquired and useful abilities of all the inhabitants or members of the society. The acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship, always costs a real expense, which is a capital fixed and realised, as it were, in his person. Those talents, as they make a part of his fortune, so do they likewise of that of the society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labour, and which, though it costs a certain expense, repays that expense with a profit.[9]

Unfortunately, this notion never became part of the main stream of economic thought. Instead, economists placed almost exclusive emphasis on investment in *physical* capital to the neglect of investment in *human* capital—a neglect which is now fast being remedied.[30]

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[8] Great Britain. University Grants Committee. *University Development, 1952 57*. London, Her Majesty's Stationery Office. Cmnd. 534, 1958, par. 150

[9] Adam Smith *The Wealth of Nations*, 6th edition, Edwin Cannan, ed., 1950, Book II, ch 1, p 264 265.

The personal profitability of an investment in a college education has been established by several studies.[31] When due allowance has been made for such factors as the greater natural talent of college graduates and education by experience after leaving college, college education would still seem to yield a substantial monetary rate of return on investment, and it may readily be presumed that the psychic rate of return in terms of more congenial employment, higher social status, and so forth is even greater.

It need hardly be said that higher education is eminently defensible on noneconomic grounds. But the hard fact is that most students go to college primarily for economic reasons. Thus, even if higher education conferred large benefits on society in general as well as on the individual in particular, there would be no justification for a subsidy as long as the rate of return was attractive and was known to be so. "Neighborhood effects" are a necessary, but in my view not a sufficient condition, for public intervention. But the fact that the majority of students take vocational degrees means that the benefits accrue overwhelmingly to the individual. It is for these reasons—profitability, motive, and individual benefit—that the costs of higher education are appropriately financed by loans.

Two conditions would be needed to enable the loan system to work well. The first is adequate information given to students on the expected yield of the various courses. Only if this were provided could rational choices be made. The second is adequate capital. It is unlikely that private capital markets would be capable, for some time at least, of supplying at reasonable rates of interest, all, or even the major part of the money required. It would be up to the Government to make the funds available.

In Britain there has been virtually no discussion of a student loan program.[32] The Anderson committee on student grants dismissed the idea in a paragraph:

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[30] See, for example, Theodore W. Schultz, Investment in Man: An Economist's View, *Social Service Review*, 33: 109-117, June 1959, and Capital Formation by Education, *Journal of Political Economy*, 68: 571-583, December 1960; Moses Abramovitz, "Resource and Output Trends in the United States since 1870", New York, *National Bureau of Economic Research*, Occasional Paper No. 52, 1960; Solomon Fabricant, "Basic Facts on Productivity Change," *National Bureau of Economic Research*, Occasional Paper No. 63, 1958; Simon Kuznets, "Toward a Theory of Economic Growth," in *National Policy for Economic Welfare*, R. Lekachman, ed., New York, Doubleday & Co., 1955, p. 39-42.

[31] For example: J. R. Walsh, Capital Concept Applied to Man, *Quarterly Journal of Economics*, 49: 255-285, February 1935; Milton Freedman and Simon Kuznets, *Income from Independent Professional Practice*, New York National Bureau of Economic Research, 1945. For a contrary view, see Gary S. Becker, Underinvestment in College Education? *American Economic Review*, 50: 346-354, May 1960, Papers and Proceedings, American Economic Association.

[32] The only references I can find on this subject are J. Wiseman, The Economics of Education, *Scottish Journal of Political Economy*, (February 1959), and A. T. Peacock, *The Welfare Society* (Unservile State Group, London). Both favor a student loan program

> We were . . . struck by the official use of the system of loans to students in, among other countries, Norway and the United States, and we felt it right to consider the merits of some such system; but, though we recognise that a loan may occasionally be a reasonable way of meeting a particular difficulty, we have had no hesitation in rejecting loans as an integral part of the national awards system. The principle of using loans as a standard means of financing students has now been abandoned by public authorities in Great Britain, and our evidence disclosed no wish to see it revived. The obligation to repay, no matter how easy the terms, must represent an untimely burden at the outset of a career. We far prefer the system of outright grants with the safeguards against misuse, contained in our recommendations.[33]

A majority of the committee recommended larger grants to students.[34]

CONCLUSION

In both Britain and the United States the current expenditure of institutions of higher learning is estimated to increase by approximately three times or more during the sixties. While large in absolute money terms, the sums required are comparatively small when related to growing national products and governmental budgets. Raising these sums should present no fundamental problems to increasingly prosperous societies. The difficulties lie rather in the devising of appropriate means.

In the simplest terms, the principal danger is that, in the United States, government will provide too little money, overstraining private sources as they are at present organized; and, in Britain, that government will provide too much money, threatening the preservation of academic freedom. In both countries the most hopeful measure of reform is a loan program for financing student costs. This would enable tuition fees to be raised sharply—in the United States to meet the expected deficiency in governmental payments and in Britain to reduce a growing and unhealthy dependence on public funds.

Nor, as we have seen, is the proposal for a loan program tied to these contingencies. Higher education is in large measure a personal investment, and, while there would continue to be ample scope for public funds and private philanthropy, it is therefore right in principle that loans to students should play a major role.

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[33] "Anderson report," op. cit., par. 24.

[34] Through the abolition of the parents' contribution.

TABLE 4.—Estimated current expenditures of British institutions of higher education, academic year 1958–59

Type of institution	Estimated current expenditures (in millions of pounds)
All institutions	111.6
A. Universities	56.9
1. Colleges at Oxford and Cambridge	5.4
2. Other universities	51.5
B. "Further education" establishments	48.7
1. In England and Wales	44.3
2. In Scotland	4.4
C. Teacher-training colleges	6.0

NOTES AND SOURCES

A-1. P. J. D. Wiles estimates expenditures for 1952–53 at £3 million (The Nation's Intellectual Investment; *Bulletin of the Oxford University Institute of Statistics*, 18: 279–283, August 1956). We assume that expenditures by the colleges at Oxford and Cambridge increased at the same rate between 1952–53 and 1958–59 as did those of the universities.

A-2. Great Britain, University Grants Committee, *Returns From Universities and University Colleges in Receipt of Treasury Grant, Academic Year 1958–1959*, London, Cmnd. 1166, 1960, table 12.

B-1. Great Britain, Central Statistical Office, *Annual Abstract of Statistics, No. 97, 1960*, table 106. (For a description of "further education," see *A Guide to the Educational System of England and Wales* (Ministry of Education Pamphlet No. 2, Great Britain, HMSO, London, 1945, pars. 97–100.)

B-2. Assumed to be 10 percent of such expenditures in England and Wales. Based on the total number of students in "further education" establishments (*Annual Abstract of Statistics, No. 97, 1960*, op. cit., tables 97 and 109).

C. The published cost of teacher training includes maintenance. From detailed analysis, Vaizey suggests a figure for expenditures by teacher-training colleges, *excluding* maintenance, of £4.6 million for the academic year 1954–55 (John Vaizey, *The Costs of Education*, London, George Allen & Unwin, 1958, table 26). Rising costs suggest a figure approaching £6 million in 1958–59.

Part IV

ECONOMIC
RESEARCH IN
HIGHER EDUCATION

CHAPTER 20

101 Questions for Investigation

Willard L. Thorp[*]

SOME ASPECTS of higher education have been explored extensively, others have had only limited examination. Thus the academic library shelves contain many more printed pages about the philosophy of education than about the management of educational institutions. There is a much more nearly complete public record of railroad conductors' salaries than of college professors'. And we have many more sociological interpretations of trade union behavior than of faculty mores, unless fiction is included.

The social scientist has tended to concentrate his attention either upon the individual or upon the economic and political aspects of society, and to overlook education, although it could qualify under all three headings. The economist also has looked away because the pecuniary calculus is not readily available and there is great difficulty in defining and measuring the "product." Many of the economists' technical devices, such as marginal analysis, demand elasticity, product differentiation, cost behavior, comparative advantage, and input-output analysis, would seem to be relevant to various problems in the education field, but they seldom have been applied.

Similarly, the political scientist has concerned himself with only a few fringe problems in this field, perhaps because higher education has such a tradition of being a private operation even though State universities now carry the heavier load. Some few, like some sociologists, have studied the similarities of academic communities to other groups, and their differences, but the study has been more casual and episodic than systematic. The psychologist has been more deeply interested in the learning process than in the working conditions of the teacher.

This state of affairs is changing rapidly. Although the problems of education were important in the past, it seems clear that we are faced today with educational choices of increasing importance and difficulty, in terms both of public policy and of organizational structure and behavior. Greatly increased resources of capital, labor, and management are being demanded to carry education forward and to raise the standards of the weaker institutions. We cannot disregard the implications for education of the rate of population growth and the accelerating expansion of knowledge. The accumulations of data of various types, development of new research techniques and methods of analysis, and the recent availability of funds for research all suggest that much will be done to shed light on these problems during the present decade.

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[*] This paper was first drafted after discussions held at the Merrill Center for Economics in Southampton, N.Y., in June 1958. Twenty-two economists and educators assembled for a week under the auspices of Amherst College and The Fund for the Advancement of Education to identify problem areas in the field of education where it was believed that research might be valuable. The author, director of the center, who presided at the sessions, made his own summary at the time, and has now amended and elaborated it somewhat further.

It seems clear that higher education is and must remain a process with wide differences among institutions. Although they may have quite different objectives, they do compete for students, faculty, and financial support. The wide spread in amounts of tuition in public and private institutions tends to create another source of conflict. And the national process of growth is pushing all of them to increase their productivity, whatever that means, within their limited resources.

These conflicts and pressures raise problems and some of them are listed below. It is obvious that it is an economist's list, although luckily the interdisciplinary boundaries among social scientists have rather low visibility. For the purposes of the list of questions given below, a number of broad and basic problem areas are not included, such as "What are the objectives of higher education?" or "How much higher education should there be and for whom?" or "What preparation is essential for teaching at various educational levels and in various types of institutions?" Problems concerning the nature and scope of the curriculum or the actual teaching process itself have been disregarded. Finally, the infinite possibilities of comparisons over time and space (especially international comparisons) have not been included in the list, although some of them might be very fruitful.

Many of the questions may be asked in terms of all education, of some type or level, or even of a single institution. It is important to note that research does not need to start with a broad coverage and an electronic machine. It is quite likely that some of the problems can only be stated properly after some individuals have made local and limited studies at their own college-level institutions, or in their own communities with respect to the public grammar- and high-school level. Analysis of costs, for example, needs to be developed in a number of individual institutions.

It is also important to realize that many of the questions asked should be considered with reference to various time intervals. A problem can be stated in its current phase, or in terms of a historical perspective, or in terms of forecasting the future. All these elements need to be considered, for the spot survey is likely to be difficult to evaluate unless one has some notion as to what the trends are.

The 101 questions do not present a complete or detailed set of problems in the field of higher education. They are intended to start the process of inquiry, and often a dozen or more questions are hidden in a single one. Although an attempt has been made to group questions that seem to be closely related, other schemes of arrangement would probably do just as well.

I. Extent and Structure of Higher Education

1. What is the direct contribution to national income which is [has been, can, should be] made by education? How should it be defined and measured?

2. To what extent does the demand for higher education reflect general business conditions and employment? How does the business cycle affect the resources available—the yields on endowment, legislative appropriations, scholarship needs, alumni gifts, and so forth.

3. What shares of various types of economic resources are devoted to educational activity in the United States? It might be useful to develop such data both in a product and in an industrial classification. Data as to capital employed are weak or nonexistent. In fact, capital goods like buildings are often not treated like capital; that is, with respect to depreciation, earned return, and so forth. Labor input needs to be examined in terms of degrees of skill and of divisions such as teaching, managerial, administrative, and maintenance.

4. How are resources (using national income subdivisions) distributed through the educational structure by level and type of education and by type and size of institution? At what points would additional resources be most productive?

5. Is there unused capacity in terms of plant and faculty? Where? Why? What appear to be present standards of use? Where does [should] obsolescence come into the picture? What motivation is there for change?

6. What is the relation between various inputs (and combinations thereof) and the level of student performance and accomplishment? Is it possible to develop meaningful concepts and techniques that would permit comparisons of performance among educational units, making appropriate allowance for differences in student potential?

7. What assumptions should be made as to future demands for higher education? What assumptions should be made concerning quality, quantity, and types of education?

8. What are the relative economic and other costs involved in creating a new institution, setting up a geographically separate branch

of an established institution, and expanding an established institution?

9. What are the relative economic and other costs involved in carrying on higher education in urban, suburban, and nonurban locations?

10. To what extent can the student "bulge" be met by expanding trade training and junior colleges? What effect would this have on resource requirements?

11. At what level should various subjects be taught? Can any appreciable saving be made by shifting the level and timing? Are extra costs incurred through not doing the right thing at the right time in the right place? What shifts and changes can be made in language study? What about remedial work and its proper location?

12. What adjustments may be needed at the college level if more "college work" is done in the high schools? How will this affect costs? Is there a similar adjustment problem between the college and the graduate or professional school?

13. What resources are now used in nonformal types of education; for example, music lessons and clubs for young people of school or college age?

14. What will be the future economic requirements for graduate and professional schools? How do their resource requirements and costs differ from those of college level institutions? How sensitive are graduate and professional schools to changes in demand?

15. How much specialized training is given and never used? What elements in past training have proved obsolete?

16. To what extent is there [will there be] further training added after the completion of formal education? What alternative methods are possible for providing specialized training and "refresher" courses? How would the costs of these methods differ?

17. What is the relation of research to teaching time and to availability of faculty to students? What is the basis for the financing of research and how much is contributed by the institution? To what extent is research a source of supplementary income to faculty and graduate students? What is involved in providing research facilities? How can [should] research interest be maintained in smaller institutions?

18. What peripheral activities affect income and cost and in what way—athletics, dramatics, university press, soil testing, employment agencies, and the like?

19. Who participates in the decision-making process in various educational institutions? In what ways do individuals or committees or other groups participate, both inside and outside the institution?

Is there any relation between faculty participation in decision making and allocation of resources as well as in the obtaining of resources? What are the limitations on freedom of planning in publicly supported institutions? In private institutions?

20. What is the effect on colleges and universities of such market situations as location and competition? What are the competitive elements in the picture? To what extent and with regard to which matters are there trade agreements and interstate compacts? Do they contribute to more efficient resource use?

II. The Student Body

21. How can one define enrollment? What is the trend in enrollment by type and level of education?

22. What factors affect the demand for college entrance? How important are the tuition charges and other costs to the students? What is the likely trend of student costs? How is college entrance affected by changes in the level and distribution of family incomes? How many students are unable to enter because of faulty preparation?

23. What is the extent and character of the enrollment in private preparatory schools? What are the charges for tuition and other costs?

24. What is the basis for student choice among various types of institutions (public and private, rural and urban, large and small, etc.)? To what extent and at what levels of education do students first leave home for schooling?

25. Are there established geographical controls indicating that a locality requires an institution? To what extent do students go to State universities outside their own States, despite tuition differentials? Should there be a national travel allowance for students?

26. How much do differences in tuition charges among institutions affect the distribution of enrollments? (In connection with the more obvious facts, there might be an examination of multiple applications to see to what extent applicants apply to—and choose among—colleges of varying tuition levels.) Similarly, how much does the amount offered for scholarships appear to control choice?

27. How extensive are scholarship programs? On what should they be based? Ability? Need? High-school record? What should the scholarship cover? How does the development of national scholarship programs affect the operation of individual institutions' programs? Are sufficient fellowships available for graduate study?

28. How would substitution of low-cost, long-term loans for direct subsidization of tuition (low or no tuition charges) alter the college

entrance of students in various economic and social groups? What are the good and the bad elements in the various student loan plans in operation? What is the potential of a loan program and what is its likely cost, on a national scale, under various assumptions of coverage?

29. To what extent are educational institutions able to make intelligent selections among applicants? What are the existing methods of selection, their effectiveness, and their cost (in dollars and in tension among applicants)? What is [should be] the extent of formal education obtained by the high school graduates of the highest brain power (perhaps the top 20 percent)?

30. Disregarding tuition and scholarship differentials, what other methods exist for competing for students? Advertising? Bonuses? Entertainment? Solicitation? Alumni persuasion or pressure? And how much are all standards distorted by special abilities such as forward passing or oboe playing?

31. Is there a tendency for prestige institutions, including graduate schools, to develop preferred sources for students? Are there observable geographical, racial, religious discriminations?

32. To what extent, when, and why do students drop out? How many return after an interval? What would be the saving if the attrition rate were higher or lower?

33. What is the possibility that junior-college graduates will enter 4-year college? How much does [can, should] this happen?

34. How extensive (and how desirable) are transfers?

35. What organizational requirements and costs are involved in the giving of advanced credit or of advanced standing or of acceleration?

36. What is the relationship of military service to the educational process? What can be learned from the GI bill experience? Any insight into college education and age, marital status, and experience?

37. What significance, if any, does the summer vacation have for students as to economic costs or earnings, and experience? Could it be utilized to greater advantage?

38. To what extent do college students work on the side? Would it be possible to substitute employment for scholarships to a greater extent?

39. Are there any observable consequences when the educational process is delayed or interrupted? What about intervals between college and graduate school?

40. What is the effect of early marriage on the students' financial needs and financial resources? On attrition of students in the colleges? On the education of husband and wife?

41. To what extent is there a trend for a semester or year abroad to be included for college credit? How is this inclusion organized? What costs are involved? What are the faculty requirements? What scholarships are required? Is such inclusion feasible on any considerable scale?

42. What are the apparent trends in the enrollment of foreign students in American educational institutions by level and type of institution? What special burdens are involved? How much special support is [should be] provided for this activity? Should it be more concentrated in a few institutions? Can these programs be evaluated?

43. What controls the enrollment in graduate and professional schools? Can one compare the number who go on with the number who might meet existing standards yet do not continue? How is selection made by students? How is their decision affected by tuition costs? Scholarships? Opportunities for employment? What is the attrition rate and why? Is there any apparent change in the quality of applicants and if so why? Do they tend to make multiple applications?

44. Is there any way of rating graduate and professional schools on an objective basis rather than relying on historical prestige? What information might improve student choice? Is there a danger of too much concentration of the better students in a few institutions?

III. Educational Costs

45. How adequate are present cost-accounting definitions and methods for educational institutions in terms of their relevance for managerial purposes, for comparative purposes, and for social evaluation?

46. What controls allocations of funds between departments and among various functions? How can costs be ascertained when teachers instruct at both undergraduate and graduate levels? Is there any basis for comparability? What variations in cost exist? Why are high-cost activities tolerated?

47. What has been the trend in the cost of education of various types and at various levels in recent years? What has been the trend in physical requirements, such as for classroom space, laboratories, library books? How has administrative cost behaved? Are there some resources which are more fully utilized than others?

48. What is the relation in marginal terms between cost and total number of students for various sizes and types of institutions? What is the relation in marginal terms between actual resource requirements and number of students?

49. What is the minimum cost of a 4-year college education and what are the added costs resulting from additions, decorations, and

diversions? What is the added cost of community living (dormitories and eating halls)?

50. What is the cost of operating a college for each of the academic years? How do junior college costs compare with 4-year college costs?

51. What can be learned about the economics of class size?

52. What costs are involved in administering "independent study"? Reading courses? Honors work? Doctoral theses?

53. What are the material requirements for college operation? How can purchasing methods be improved? What about methods of buying and handling books?

54. What is the relationship between cost and multiunit operation?

55. Are there improved methods of space utilization and control?

56. What are [can be, will be] the effects on the cost of education and on faculty requirements of various innovations in instructional and administrative techniques and in utilization of new media of communication such as television?

57. What are the economic implications of a changed college calendar? Of an accelerated college course reducing the time to 3 years? The use of reading periods on or off campus? A year abroad as a part of the formal educational process?

58. What is the actual elapsed time for graduate work? What is the estimated cost of a Ph. D. and of the various professional degrees to the individual? To the institution? To society?

59. Can costs be reduced by additional cooperation between schools within a university and among universities?

IV. Teacher Supply and Salaries

60. What can be said as to the derived demand for teacher services, in terms of predictions as to enrollments?

61. What in fact does a faculty member do? What is his real teaching load? How much service does he give to the profession? How much time is devoted to personal scholastic maintenance and development? To what extent are nonteaching demands made on the faculty by the educational institution? What are the noncompensated demands made by the community? How equitably and by whom are these claims on the teachers' time distributed? To what extent are teachers required to perform tasks that might be performed by less expensive personnel?

62. What factors affect the supply of teachers—salaries and fringe benefits, degree requirements, social position, and so forth? How extensive is the move of high-school teachers into college teaching?

63. To what extent have faculties absorbed foreign scholars, and at what level of the college course have these foreign scholars been absorbed permanently or temporarily? In which fields? At what rank? Have any special costs been involved?

64. To what extent are graduate students engaged in teaching? In research? Are they teaching elementary or advanced courses? With how much supervision? At what scales of pay? How does this affect the overall budget? Does it delay the graduate work of the teaching fellow?

65. Where do graduate students finally go and why?

66. What has been the historical record of teacher salaries, with appropriate allowances for fringe benefits, conditions of work (including availability of outside employment), and the age and qualifications of the teacher?

67. How adequate are retirement arrangements for faculty and for other employees?

68. To what extent do teachers earn additional income through other employment? How do institutions safeguard effective instruction? How much variation is there in their procedures on outside employment and why?

69. How are faculty administrative positions handled, such as that of head of a department? Is extra compensation granted? Reduced teaching load? What should be the division of labor between faculty and administration?

70. What would be involved in more "refresher" or developmental activity for teachers? How costly, how necessary, and how valuable are sabbatical leaves?

71. What are the trends as to leaves of absence? How important are fellowships and grants for temporary absence from the campus as a factor in reducing the supply of teachers on duty?

72. To what extent is faculty housing provided? How are housing provisions administered? What is their economic role?

73. What salary differentials are [should be] found within institutions, and among institutions? By subject area? By character of preparation? By seniority? By type, character, and location of the institution? What would be the result of substantial increases in the top salaries?

74. To what extent do civil service requirements reach into public colleges and universities?

75. What costs would be involved in expanding the supply of teachers for junior colleges?

76. What is the nature of the labor market for teachers? Can it be improved? Is there enough, too much, or too little mobility and turnover?

77. To what degree does academic tenure prevent the management of an educational institution from behaving like a rational employer, removing "expensive" or incompetent employees?

78. To what extent do mature individuals otherwise employed shift to the academic world, and vice versa? What fields have the most mobility? Could not more women over 40 be attracted back to teaching or research?

V. Financing

79. What are the trends in the sources of financing of privately and of publicly supported institutions, including tuition as source?

80. Are any considerable number of private institutions under severe financial strain? What is the death rate of private institutions? Is the problem caused by competing low-tuition public institutions? Is there similar pressure on junior colleges? On graduate schools?

81. What is the economic effect of church sponsorship? On contributions? On faculty recruitment? Are special costs involved?

82. What is the actual burden on the taxpayers of public educational institutions? Of private institutions via tax exemption of gifts?

83. What is likely to be the future trend of private gifts? How is this related to income levels? To tax levels? What economic considerations enter into gifts from individuals, corporations, and philanthropic bodies to private institutions and to public institutions?

84. What is the record of alumni contributions? How do they vary by age of donor and by type of institution? Do they bear any relation to capacity to pay? To what extent do alumni contributions represent the equivalent of a delayed payment?

85. How are educational endowments administered? What economic principles should be applied?

86. To what extent are State and local governments in a position and willing to finance educational expansion at the junior-college or the 4-year college level? At the graduate and professional-school level? How would the situation be changed by various Federal programs of guaranty, credit, or grant?

87. How much income is the result of using facilities for noneducational purposes (campus for summer conferences, and so forth)?

88. What has been the experience—advantages and disadvantages—of Federal programs relating to education? What has been the

experience in land-grant colleges? In Government contracts? In the Reserve Officers' Training Corps? What bases might be used for allocating Federal aid to higher education? To what extent and on what basis should public funds be available to private colleges?

89. On the basis of estimated future enrollments, what plant construction will be required in the future? What costs are involved, broken down into public and private, geographical location, and type of facility?

90. With particular reference to capital requirements, what methods of financing, including tax sources, should be used for public schools and public colleges? What has been the financial experience with dormitory and other financing up to the present? When and for what purposes do [can, should] various types of institutions of higher learning engage in borrowing?

91. What forms of aid from foundations appear to have had the greatest impact upon educational institutions? Can directed aid in fact be prevented from spreading through the budget?

VI. Evaluation

92. Are there criteria and measurements of the historical development of education which might indicate its relation to American society? What seem to be the forces that controlled the development of education? Has education adapted itself speedily to changing needs? In turn, what was its impact?

93. Is it possible to break down the "product" into such elements as training for citizenship, general tools for living, and specialized tools, and then measure the allocation of resources to each purpose?

94. What part have institutions of higher education played as pools of skilled manpower and research resources in time of national emergency?

95. What resources do educational institutions devote to the advancement of knowledge? What is [ought to be] their future role in view of the expansion of industrial and governmental research and development programs?

96. What is the cost, or the benefit, involved in keeping young people off the labor market?

97. What part can education [educational institutions, educational resources] play in the development of less developed countries? How can this activity best be organized? What are the chief costs involved? How much priority should it be given as compared with other demands?

98. What is the level of educational input and output by States (with particular reference to possible criteria for Federal contribu-

tions)? Can specific benefits and results be attributed to publicly supported institutions? What is the relation, if any, between the *level of education in the State and the level of productivity and of* incomes? Of outmigration or inmigration?

99. What is the relationship between the degree of education and the level of personal income? (This not only involves the estimation of present worth of various levels and types of education, but also the development of a method of imputation to education when corrected for different initial endowments and economic and social advantages.)

100. What is the relationship between education and other measures of personal achievement? (Here also "value added" concepts must be developed along with methods of measurement.)

101. What is the present amount and productivity of resources now being spent in studying problems of education? And how can a greater number of competent scholars be induced to apply their skills and techniques to answering some of the above questions—and raising others?

Perhaps the last question should be the first.

CHAPTER 21

Research in the Economics of Higher Education: Progress and Problems

*Alice M. Rivlin**

THE ECONOMICS OF EDUCATION is a new field of study. Until very recently most economists viewed the problems of educational enterprises as outside their sphere of interest and competence, and educational decision makers showed little disposition to call on economists for help.

This situation is changing. Within the last few years the economics of education has become a respectable, even a fashionable field in which to write a doctoral dissertation or direct a research project. A president of the American Economic Association has even devoted a presidential address to the subject.[1] Economists have begun to investigate the return on investment in education, the demand for and supply of persons with specific types of training, the economic advantages and disadvantages of alternative means of financing education, the comparative costs of different ways of organizing an educational system and so forth. Those who make decisions affecting education have also begun to realize that this type of research may be useful to them and to call for more of it.

Several conferences have been held on the economics of education, both here and in Europe, and some of the papers delivered at these meetings have been published. A few articles on the economics of education have appeared in professional economic journals. Much work, however, is still in progress, and the results have been distributed in processed form, if at all, or published in journals not easily accessible. It is the purpose of this article to review as much as possible of the recent research in this field, mentioning some studies in progress, as well as some which have been completed, to assess roughly what has been accomplished so far, and to suggest some of the problems on which future efforts should be concentrated.

As in the rest of this publication, the focus will be on higher education—that is, education beyond the high-school level—although references to other levels of education are necessarily included, since higher education cannot meaningfully be viewed in isolation from the rest of the educational system.

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*Research associate, Brookings Institution.

[1] Theodore W. Schultz. Investment in Human Capital. *American Economic Review*. 51 : 1–17, March 1961.

What Good Are Economists?

The reluctance of educators and educational decision makers to turn to economists for advice and counsel has by no means entirely disappeared. Some research in the economics of education—especially attempts to compute rates of return on investment in education, or consideration of the costs of alternative teaching methods—has met with protests from educators. The protests have been directed not so much against the methods and conclusions of the economists, but against the whole idea of doing this kind of research. Education, say some educators, is far too precious to be compared in crass money terms with the ordinary commodities and services that are bought and sold in the marketplace. The instruction of our children is, or should be, so important to us that we are willing to devote to it whatever resources are "required," regardless of cost. Not all educators take such extreme positions, but even those who do not are often fearful that if economists are turned loose on educational problems they will recommend cheaper methods of doing things even though these methods produce inferior results. These educators have visions of economists pointing out that it would be cheaper to teach students in classes of 400 than in classes of 15, or that money can be saved by substituting television tapes for live teachers—without bothering to investigate how much the students really learn in these different situations. Or they imagine economists estimating that the rate of return to an individual on investment in a college education is lower than on other investments (a conclusion *not* supported by any evidence so far) and advising that fewer students be sent to college—without considering the cultural and spiritual values of education to the individual or the benefits of his education to others besides himself.

The answer is that if economists behave in this irresponsible fashion—and almost none of them have—they are not being good economists. The educators' fears are based largely on misconceptions about what economics is, and hence it may be useful to spend a few paragraphs considering just what it is that economists may be expected to contribute to the solution of educational problems if they do their job well.

It is not the job of the economist to tell people or nations what they ought to want. Rather it is his job to assist them in making choices which will bring them as close to what they want as possible. It is his job to point out—what should be obvious, but often is not—that their resources are never adequate to do all the things they want to do and that they must make choices among alternative uses of these resources. Raw materials and labor and machinery and time devoted to one use must be taken away from others. At a given moment more of one thing generally means less of another. More in the present generally means less in the future. The basic function of the economist is to show those who make these decisions what alternatives they face and what the consequences of various choices seem likely to be. He should point out which combinations of objectives are not feasible (in the sense that they cannot be attained simultaneously with the resources available), which methods of using resources are inefficient (in the sense that the same objectives can be attained at a smaller cost), and what are the consequences of applying various explicitly specified criteria of choice to the alternatives that remain.

If a nation's representatives are deciding whether to spend a certain amount of tax money either on schools or on superhighways, the proper role of the economist is not to express his own subjective preference, but to marshal what evidence he can about the probable consequences of each choice—to point out what the immediate and the eventual benefits of each seem likely to be and to whom they will go, and to show what the impact on the economy as a whole might be in the near and the distant future. It is not obvious that the Nation's representatives should choose the alternative that maximizes expected national income, although this would be one criterion of choice which an economist might suggest, but it is clear that the impact on national income, among other things, is relevant to an intelligent choice.

Some educators have the idea that an economist cannot be of any help with a problem unless all the elements of the problem are easily translatable into money terms. This is not really true. A problem of choice is usually easier to handle if all the costs and benefits of the various alternatives can be made commensurable by expressing them in some common unit such as money, but this is not always necessary or even useful. If an economist were addressing himself to the problem of how best to utilize the existing resources of an educational institution, he might not want to introduce the subject of money at all. He might just concern himself with the educational output that could be produced by making use of professors' and students' time and of buildings in different ways—the output being expressed in test scores or in measures of student satisfaction. The main usefulness of an economist in this kind of situation is that, being in the habit of thinking about alternatives and measurable costs and benefits, he may ask the right questions and get other people started thinking in these terms, too.

The difficulties are much greater when the costs and the benefits cannot be measured. Nobody thinks we can measure—in money or in any other units—the cultural and spiritual benefits of education to a person or to a nation. These benefits are certainly very great and they should not be ignored just because they cannot be measured. On the other hand, their existence should not preclude all objective thinking about costs and benefits in education. Many of the benefits of education *are* measurable, at least approximately, in achievement tests, expressed satisfaction, job performance, and income. Almost all of the resources used in education are measurable—in physical units and their monetary equivalents. Since these resources are far from unlimited, it certainly makes sense to think about their efficient use in achieving the measurable benefits of education—as long as the measurements are not taken too seriously and the immeasurable benefits are not forgotten.

Somewhat arbitrarily, I have divided studies in the economics of higher education into three groups. The first group consists of studies of the Nation's total investment in education and the return on that investment. The second, discussed somewhat more briefly, consists of studies of the supply of, and the demand for, educated persons—studies of college enrollment and manpower. The third includes research on the financing of education.

I. Total Investment in Education and the Return on the Investment

Generations of economists, going back at least as far as Adam Smith, have paid lipservice to the importance of education, not only for its own sake but as a contribution to economic growth. There are a great many motives for getting an education, but clearly, when people take resources away from present consumption to devote them to training and education that enable them to earn more income in the future, they are, whether they plan to or not, making an investment in themselves—one that has many similarities to an investment in a factory or a machine.

Until quite recently paying lip service was about all that economists did with regard to investment in human beings. In order to simplify the world with which they had to deal, economic theorists generally assumed it to be peopled with homogeneous laborers working with a fixed technology. Output in such a simplified world could, of course, grow only as the number of workers grew or as the amount of capital or natural resources per worker increased. With this simple picture in mind, economists concentrated much of their effort on studying the process of physical capital accumulation, neglecting changes in the skills and knowledge of the human agents that work with this capital.

Regrettably—at least for the economists—increases in the amount of physical capital per worker proved only a partial explanation of the fantastic increase in production that actually occurred in the real, unsimple world in which we live.

Some recent hard work on historical statistics for the United States has made this particularly obvious. Among the most quoted statistics are those brought together by Fabricant, who indicates that the total physical output of our private domestic economy grew 3.5 percent per year between 1889 and 1957.[2] Part of this growth, he found, was attributable to an increase in the size of the labor force, but by no means all of it, for output per man-hour increased by about 2.0 percent per year in this period. Some of this increased productivity per man-hour in turn, he concluded, can be attributed to increased capital, but not very much of it, for output per (weighted) unit of capital and labor combined grew at a rate of 1.7 percent per annum.

Others have come to similar conclusions. Solow, for example, approaching the problem somewhat differently, estimated that only about 10 percent of the increase in output per man-hour in the period he was observing (1909-49) could be attributed to increases in the amount of capital.[3]

The failure of physical capital accumulation and increases in the number of workers to explain economic growth has forced economists to look for other possible explanations, long mentioned, but hitherto largely neglected. They have turned principally in two directions. First, they have begun to study the mechanism of technological change—how improvements in the methods of production come about. The economics of research, invention, and innovation are now the subjects of a rapidly burgeoning literature. Secondly, they have begun to study changes in the quality of the labor force and the process of investment in human beings, especially investment in health and education.

The first step toward determining how important investment in education is to economic growth is to find some way of measuring the amount of such investment. Defining and measuring educational investment is every bit as difficult as defining and measuring physical investment, maybe more so, and a great deal of recent effort has gone into simply finding ways of measuring investment in education in the United States and other countries at different points in time. Various possible approaches to the problem and some of the difficulties are elucidated by Bowman and by Eckaus.[4]

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[2] Solomon Fabricant. *Basic Facts on Productivity Change.* National Bureau of Economic Research, Occasional Paper No. 63. New York, The Bureau, 1959.

[3] Robert M. Solow. Technical Change and the Aggregate Production Function. *Review of Economics and Statistics,* 39: 312-320. August 1957.

For a computational correction, *see* Warren P. Hogan. Technical Progress and Production Functions. *Review of Economics and Statistics,* 40: 411-413, November 1958. For similar findings, *see also* Benton F. Massell. Capital Formation and Technological Change in United States Manufacturing. *Review of Economics and Statistics,* 42: 182-183, May 1960, and Aukrust, Odd, and Bjerke, Juul. Real Capital and Economic Growth in Norway, 1900-1956. In *The Measurement of National Wealth,* Raymond Goldsmith *and* Christopher Saunders, *eds.* (Income and Wealth Series, vol. 7), London, Bowes & Bowes, 1959, p. 80-118.

One difficulty is that while factories and machines are seldom wanted for their own sake, apart from the goods they can produce, much education is considered desirable in itself, as a contribution to the good life rather than as a means to future income. Education is partly investment and partly consumption, and it is very difficult to separate the two. It is so difficult that many economists have decided to ignore the problem and treat all education as though it were investment.

The simplest way of measuring this investment in education in a given year is to add up the number of years of schooling acquired by the population in the period. This, however, is nearly as unsatisfactory as measuring physical capital investment in numbers of machines. It makes about as much sense to equate a year in second grade with a year of advanced chemical engineering as it does to equate a small lathe with a turbine generator. The school years, like the machines, have to be weighted in some way if comparisons between different times and places are to have any meaning at all.

One way to weight them is in terms of their costs—a procedure often used in measuring physical capital. The costs used may be either costs of production or costs of reproduction; that is, a unit of schooling acquired in a past year can be valued either in terms of the resources actually devoted to its production in that year or in terms of the resources that would have to be devoted to replacing it with an equivalent unit in the present.

Another distinct possibility is to focus on the yield of the education, valuing a unit of schooling either in terms of its expected contribution to productive activity at the time it was acquired (its capitalized expected earnings) or in terms of the expected contribution of an equivalent unit in the present.

Schultz has taken the cost of production approach in making estimates of gross investment in education in the United States in the period 1900–56.[5] He limits his attention to formal schooling at the elementary, secondary, and college or university level. His estimates include both the direct cost of education (outlays for teachers' salaries, books, equipment, maintenance of buildings, etc.) and the indirect cost of the earnings forgone by students who would have been working if they had not been studying. The main outlines of the picture emerging are that since 1900, gross investment in education has been far from an insignificant part of total investment in the United States and that it has been growing rapidly relative to gross physical investment, rising from 9 percent to 34 percent of gross physical investment between 1900 and 1956.[6] Also income forgone by students has been an increasingly important part of total educational investment, partly because enrollment has grown faster at the high school and college levels than in elementary schools.

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[4] Mary Jean Bowman, *and* R. S. Eckaus, chs. 6 and 8 of this publication.

[5] Theodore W. Schultz. Capital Formation by Education. *Journal of Political Economy*, 68: 571–583, December 1960.

Some refinements of this general approach are suggested by Blitz.[7] In particular, he has attempted to include in the cost of education the value of the free services rendered to tax-exempt educational institutions by State and local governments—such services being assumed to be roughly equal to the estimated value of the property and sales taxes which these institutions would have paid if not exempt. Blitz also believes that Schultz' estimates of income forgone by college students are too low, since they are based on the average earnings of college-age workers actually in the labor force. College students, with their generally superior ability could presumably earn more than this on the average if they decided to quit school in search of permanent full-time jobs. Blitz offers some alternative estimates. Schultz, incidentally, has pointed out that his own estimates of earnings forgone may also have an upward bias, since he did not subtract the earnings of students while they are in college (income not forgone).[8]

There has been some confusion over the question of whether food and maintenance of students should be included in the resources devoted to education. Clark and Sobkov estimated the total cost of education in the United States in 1956–57, including on-the-job and adult education, as $59 billion, or 17 percent of the national income.[9] Over 40 percent of this startling total consisted of an estimate ($600 each) of the minimum cost of feeding, clothing, and sheltering the more than 40 million students enrolled in the regular school system from kindergarten to college. That cost, however, is not properly a cost of education. It is simply a cost of having these young people in the population. They would have to be fed whether they were in school or not. On the other hand, the contribution to national income which these young people would have made if they had been working instead of studying *is* a proper cost of education. It is a real cost, not only to the students but to the economy, which is deprived of a certain amount of production (roughly measured by the students' forgone earnings) if part of the potential labor force is in school.

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[6] Ibid., p. 583.

[7] Rudolph C. Blitz, ch. 10 of this publication.

[8] For some other discussions of Schultz' estimates, *see* R. S. Eckaus, ch. 8 and app. B of this publication.

[9] Harold F. Clark *and* Ruth E. Sobkov. How Much Can the People of the United States Afford To Spend on Education? New York Teachers College, Columbia University, processed, table C, undated (about 1958).

It is a real cost to the economy which should be considered in deciding whether it would be economically advantageous to increase the number of young people going to school. The only question is how this forgone income should be measured. As we have seen, Schultz and Blitz take as their measure the income that an average person with the characteristics of a student can presently earn if he is not in school (although they differ in their estimates of this income), multiplied by the number of students. This approach will yield a valid enough approximation if there is little unemployment and if one is concerned with measuring the amount of national investment involved in small or gradual changes in the number of students. It is not valid if there is substantial unemployment or if one is concerned only with large or rapid changes. If half our present college population suddenly left college, for example, national income would not increase by anything like as much as the Schultz or Blitz estimates of income forgone by these students. Many of them would be unemployed and would be absorbed by the economy only slowly and at lower rates of pay than now commanded by persons in the same age group.

To go back to Clark and Sobkov, another reason why their estimate of the total cost of education is so high is that they include not only the costs of formal education in schools and colleges, but the costs of other types of education—business and industry courses for employees, study in organized groups (extension, adult education, labor union and club courses, etc.), and "systematic self-education" (correspondence courses and the like). Clark and Sobkov stress the unreliability of their statistics concerning these other kinds of education, but their study at least directs attention to the fact that much educational activity goes on outside the regular school and college system and to our need to know more about these activities.

One should not leave this subject without mentioning that parallel efforts to measure the resources devoted to education are going on in other countries besides the United States. In estimating educational investment in the United Kingdom for 1953, Wiles attempted to include the costs of industrial apprenticeships and of adult education.[10] His study was followed by a thorough attempt by Vaizey to piece together estimates of total expenditures on education in the United Kingdom in the years 1920-55.[11] Vaizey has also attempted some tentative international comparisons in a document prepared for the Organization for European Economic Cooperation.[12]

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[10] P. J. D. Wiles. "The Nation's Intellectual Investment." *Bulletin of the Oxford University Institute of Statistics*, 18: 279-90, August 1956.

[11] John Vaizey. *The Costs of Education*. London, George Allen & Unwin, 1958.

[12] John Vaizey. Some Notes on the Relation Between Economic Growth, Social Change, and Investment in Education. Paris, Organization for European Cooperation, 1959, processed. *See also* F. Edding. *Internationale Tendenzen in der Entwicklung der Ausgaben fur Schulen und Hochschulen*, Kiel, processed, 1958.

So far we have been talking about attempts to measure the gross investment in education or the value of new education acquired in a given year. There have also been attempts to measure *net* investment, or additions to the stock of education, minus depletions of that stock in a given year, and to measure the stock itself. There are some difficult problems here, just as there are in measuring the stock (or net additions to the stock) of physical capital. Among other things it is necessary to distinguish between the stock of education embodied in the labor force, which might be called the active stock, and the stock of education embodied in the whole population or the population of working age, some of which is not actively in use.

Schultz makes a start by simply aggregating the number of years of education embodied in the labor force at different points in time, adjusting for changes in the length of the school year.[13] (He makes a similar computation for the population over 14.) He evaluates different stocks in terms of the cost of reproducing them in 1956 prices. The differences between these estimates for successive years would yield estimates of net investment in education in the following sense: the cost of education of new entrants to the labor force, minus the cost of the education of those dying or leaving the labor force. This is the sense in which Wiles computes net investment in education in the United Kindgom.[14]

Schultz and Wiles do not allow for depreciation of human capital. They treat a man's education as having a constant value over his lifetime, a value which drops suddenly to zero when he dies or leaves the labor force. Physical capital, however, is generally treated as though it were used up, not all at once, but gradually over its lifetime, its value falling to zero over a period of time. Human capital ought to be treated in the same way if meaningful comparisons are to be made, either over time or with physical capital. Clearly the same number of completed school years is more valuable if embodied in a relatively young labor force than if embodied in a relatively old labor force, since the young labor force will be producing for a longer time in the future—a point that Schultz recognizes, but does not adjust for. Moreover, educational capital, like physical capital, not only depreciates, it obsolesces. Some would question whether the quality of education has risen over time, but few would deny that recently acquired knowledge is most applicable to current problems and procedures.

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[13] Theodore W. Schultz. Education and Economic Growth. In National Society for the Study of Education, Sixtieth Yearbook, Nelson B. Henry, ed., part 2, *Social Forces Influencing American Education, 1961*. Chicago, University of Chicago Press, 1961.

[14] Wiles, op. cit.

Hansen computes the value of the stock of education in the United States at the college level in 1949—applying Schultz' cost of production estimates to the college education held by each age group and then allowing for straight-line depreciation (but not for obsolescence).[15]

One way of avoiding the depreciation problem (and acquiring some others) is to abandon the cost-of-production approach altogether and to estimate the value of the stock of educational capital on the basis of its expected future yields, discounted at some appropriate interest rate. The value of a given amount of education embodied in a young man in this type of computation is high because it is expected to yield an income over a long period, while the value of the same education embodied in an older man is less, since much of the income yield is a thing of the past. There are at least three difficulties, however: (1) The only measure we have of the yield of education is the average difference in income between persons with different amounts of schooling. This may not be a very good measure, because amount of education is closely related to ability and to other things that affect incomes. (2) One cannot predict future incomes according to education with much confidence and must generally rely on cross-sectional distributions of income by age and education at a given moment. (3) The results depend heavily on the discount rate chosen.

Renshaw has made some rough calculations of the present value of the educational capital embodied in the labor force by this method and finds that they do not differ drastically from Schultz' cost-of-production estimates.[16]

Along the same lines a recent paper by Weisbrod suggests some interesting comparisons between regions on the basis of the value of their human capital.[17] He makes the point that for some purposes the value of human capital in different regions as measured by expected future income is a better gage of economic well-being than is current income. A region with a high proportion of young people may have a comparatively low per capita income, especially if a large proportion of the young are enrolled in school and college, but it may have much better income prospects than a region with an older population, a higher proportion of which is in the labor force. Weisbrod computes expected income per capita for four cities on the assumption that income, survival rates, and labor-force participation rates by age remain constant. He does not explicitly introduce education into his computations, although this would be a logical improvement and might yield some interesting suggestions about the incentives for interregional migration by people at different age and education levels.

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[15] W. Lee Hansen. Rates of Return on Human Versus Non-human Investment. Economics Department, University of California at Los Angeles, draft papers October 1960.

[16] Edward F. Renshaw. Estimating the Returns to Education. *Review of Economics and Statistics*, 42: 318–324, pt. 1, August 1960.

[17] Burton A. Weisbrod. An Expected-Income Measure of Economic Welfare. St. Louis, Washington University, Economics Department, processed, March 1961.

Although the "expected income" approach has not been employed very much in estimating the total value of educational stock in being, it has frequently been used in computing the value of a specific amount of education to an individual planning to undertake it. Several years ago Glick and Miller wrote an article in which they estimated the lifetime incomes of persons with varying amounts of education, based on average (mean) income by age and education in 1949.[18] They were not the first to look into this question. Walsh, for example, had written an article in 1935 in which he estimated lifetime incomes by education, including specific types of professional education, from an assortment of cross-sectional age-income studies.[19] The Glick and Miller study, however, received a great deal of attention and set off a chain reaction of other related work. The most quoted figure from the Glick and Miller article was their estimate that the lifetime income of the average male college graduate was about $100,000 more than that of the average male who never went beyond high school. Despite the explicit objections of Glick and Miller to this interpretation, $100,000 was widely referred to as "the value of a college education."

Some of the arguments against this interpretation were stressed by others. Houthakker, for example, pointed out that estimates of the Glick and Miller type were based on income before taxes and that no attempt had been made to discount future incomes back to the time at which the decision to acquire the education was made.[20] A dollar now is clearly more valuable than a dollar 10 years from now, and the rate at which the future income is discounted is important. The income of college graduates is more heavily concentrated in the later years of life than is the income of high-school graduates, so that the college graduate's advantage dwindles as the rate at which the future is discounted goes up. This is very clearly shown in Houthakker's illustrative computations.

Bridgman focused on another difficulty: the fact that college graduates have higher average ability than high-school graduates.[21] This, coupled with fragmentary evidence that persons with more ability have larger incomes even when they do not have more education, would indicate that part of the "value of a college education" is just the value of being more intelligent. Bridgman also emphasized the very wide dispersion in the incomes of both high school and college graduates.

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[18] Paul C. Glick and Herman P. Miller. Educational Level and Potential Income. *American Sociological Review*, 21: 307-312, June 1956. *See also* Herman P. Miller, ch. 9 of this publication.

[19] J. Raymond Walsh. Capital Concept Applied to Man. *Quarterly Journal of Economics*, 49: 255-286, February 1935.

[20] H. S. Houthakker. Education and Income. *Review of Economics and Statistics*, 41: 24-28, February 1959.

[21] D. S. Bridgman. Problems in Estimating the Monetary Value of a College Education. *Review of Economics and Statistics*, 42: 180-184, August 1960, pt. 2.

Whatever the interpretation of the differentials between college and high school graduates' lifetime incomes, it would be interesting to know whether they have been widening or narrowing over time. The number of college graduates has been increasing so fast that one might expect their relative advantage over high-school graduates to have declined. According to a recent article by Miller, however, there is no evidence of such a decline since 1939.[22] In fact, after adjustment for price changes, the ratio of average lifetime income of college graduates to that of high school graduates (as shown by cross-sectional data for 1939, 1946, 1949, 1956, and 1958) has been very nearly constant between 1.5 and 1.7.[23]

Renshaw [24] suggests that there may have been a substantial fall in the lifetime income advantage of college graduates between 1926 and 1939, but the reliability of the data for 1926 is open to question.

The main reason for wanting to know the "value" of a higher education is to compare this value with the cost in order to see whether higher education is a profitable financial investment. Another way of looking at the same problem is to compute the rate of return obtained on the cost of a higher education and compare this with rates obtained on alternative investments.

The profitability of higher education can be looked at from the point of view of the individual or from the point of view of society as a whole. The individual, presumably, is interested in the relation between the expected increase in his own income if he invests in higher education and the cost of that education to himself. This, among other considerations, is relevant to his choice of career.

Walsh, and Friedman and Kuznets, looked into the profitability of various types of higher education from the point of view of the individual—the *average* individual, that is. Walsh found the average value of a college education, as well as of legal and business school training, to be considerably greater than the cost to the average recipient (discounting at 4 percent).[25] Friedman and Kuznets, though critical of some of Walsh's procedures, supported his general conclusions.[26] They were principally interested in explaining the existing income differentials between professional and other workers and among the various professions. They came to the conclusion that training costs alone explained only part of these differentials. For example, they estimated that in order to earn a reasonable return (4 percent) on the average direct and indirect cost of the additional training required to enter medicine, the average physician would have to have an annual income 17 percent higher than the average dentist.[27] In fact, the average income of physicians seemed to be about 32 percent higher than that of dentists in the period they were examining, indicating that the average physician was receiving a good deal more than a 4 percent return on the costs of his training.

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[22] Herman P. Miller, "Annual and Life-time Income in Relation to Education, 1939–1959," *American Economic Review*, 50: 962–985, December 1960.

[23] Ibid., p. 984.

[24] Renshaw, op. cit. (Note that Renshaw's estimates are of median, rather than mean, lifetime incomes.)

[25] Walsh, op. cit.

More recent and more complete evidence on rates of return in the professions and their implications for career choice is being examined by Hansen.[28]

A thorough review of the evidence on rates of return on investment in higher education has been undertaken by Becker at the National Bureau of Economic Research.[29] Becker is not much concerned with the rate of return to individuals on the costs to them, although he does compute such rates. After adjustments for differences in color, ability, unemployment, and certain other factors—adjustments not made by Walsh or by Friedman and Kuznets—Becker estimates that the mean lifetime income advantage (after taxes) of college graduates over high school graduates, as computed from age-income data for 1940, represented about a 12.5-percent return on the average private costs of college attendance. This estimate is for urban white males only, the returns for other population groups being apparently somewhat lower. By 1950, the private rate of return seems to have dropped to about 10 percent largely because of increases in the income tax.

These returns seem high enough to encourage a considerable increase in college going, but as Becker points out they are not really relevant to the question he wants to answer: Could national income be increased by changing our level of investment in higher education? To answer this question one needs to know what rate of return society as a whole is getting on the resources devoted to higher education and how this compares with rates of return obtained on resources devoted to other types of investment. The social return on education will differ from the private return for two reasons: (1) because not all the costs of higher education are borne by the individual, and (2) because not all the income produced by the education accrues to the individual who obtains it.

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[26] Milton Friedman and Simon Kuznets. *Income From Independent Professional Practice.* New York, National Bureau of Economic Research, 1945, chs. 3 and 4.

[27] Ibid., p. 126.

[28] W. Lee Hansen. "Shortages" and Investment in Professional Training. Economics Department, University of California at Los Angeles, draft paper, 1961.

[29] Preliminary results are reported in his article, Underinvestment in College Education? *American Economic Review,* 50: 346–354, May 1960.

The first point is easier to cope with than the second, since reasonably good estimates can be made of the total resources going into higher education. On the second point, one component of the social return on educational investment is the income tax paid by an individual on additional income attributable to his education. Other components, such as the spillover effects on the incomes of other people, are not so easy to measure, and Becker does not attempt to measure them. He simply computes the rate of return that equates the average total cost of college education per student with the value of the average difference in lifetime incomes of high school and college graduates before taxes (after adjustments for ability and other differences). Becker estimates that for urban white males, this rate was about 9 percent both in 1940 and in 1950, and that for other population groups it was probably lower. The 9 percent does not seem very high when compared with Becker's estimate of an average rate of return on business capital of about 8 percent. Becker concludes that, if his computations are substantially correct, persons who argue that increasing investment in higher education relative to other investment will enhance economic growth will have to show that this increased educational investment is likely to contribute to raising national income through effects on the incomes of others than those educated.

Even though Becker's full study has not yet been published, it has already aroused considerable discussion. The discussion centers on the implications for economic growth of his comparisons between rates of return on educational investment and rates of return on business investment. Becker has been criticized—perhaps somewhat unfairly, since he explicitly limits himself to consideration of direct returns—for neglecting the indirect economic benefits of educational investment. If investment in the education of individuals raises, not just their income, but the whole income distribution—through its effects on research and development or through other indirect means—then the total rate of return on education will be higher than the private return measured by Becker. Attention has also been called to Becker's omission of the fact that education is desired as a public and private consumption good for its own sake, not just as an investment in future income. If a part of the resources devoted to education is intended as consumption, then the rate of return on that part which is intended as investment is higher than the rate of return on the total.[30]

In this connection, Denison has pointed out that whether the persons spending for education think of themselves as consuming or investing is not as important as whether these resources would have been used for consumption or investment if they had not been spent on education. Families that reduce their consumption in order to pay for education might not do so to make other types of investment even at a higher return; and the taxes that support public spending for education reduce consumption as well as investment. Hence, additional investment in education may make a positive net contribution to economic growth even if the rate of return on this education is considerably lower than that on business investment.[31]

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[30] Both of these points are made in Henry H. Villard's discussion of Becker's paper in the *American Economic Review*, 50: 355–378, May 1960.

On somewhat more technical grounds, Becker's juxtaposition of different types of rates of return has been questioned. Hansen points out that Becker averages the return on the stock of business capital (current income expressed as a percentage of the value of existing business capital) and compares it with an internal rate of return on education (the rate that equates the present value of expected income from education with its cost). According to Hansen's computations, the average rate of return on the stock of educational capital is considerably higher than the comparable rate of return on capital in manufacturing.[32]

It should be noted that even if one could compute comparable rates of return in education and in business for the recent past, one would have to be cautious in their interpretation, not only for the reasons already stated, but also because the education "industry" is not composed of profit-maximizing firms. When one compares rates of return in two segments of the business sector to see which one seems to be more profitable, one is assuming that the firms in the industry are already exploiting the most profitable opportunities since they are forced to do so by the necessity of competing with each other in the marketplace. This assumption is dubious, even in manufacturing, and it is much more so in education. Heavily subsidized educational institutions are not forced to compete with each other to increase the economic benefits passed on to the student. They may be missing opportunties on which the rates of return are high.

Taking quite a different approach, Denison has attempted to measure the role of education in economic growth in the United States from 1929–57 and its possible role in future growth.[33] In a series of computations too complicated to describe here, he uses adjusted income differentials between education groups in 1949 to convert changes in the amount of formal education embodied in the labor force into changes in the size of the labor force that are estimated to have the same impact on output. He assumes that a given percentage change in the size of the labor force and in the value of capital produces a constant percentage change in output throughout the period—what the economists call constant returns to scale. On these assumptions he attributes over a fifth of the 2.9 percent average annual growth rate in the period 1929–57 to increases in the quality of the labor force associated with more formal education. He also indicates that prospects for further contributions from education to raising the growth rate in the future, while by no means negligible, are less spectacular than in the past, on account of the high level of education already achieved.

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[31] Edward F. Denison, *The Sources of Economic Growth in the United States and the Alternatives Before Us*, draft of a book, March 1961, p. 126–128.

[32] Hansen, op. cit. See footnote 15.

[33] Denison, op. cit., ch. 7.

Before leaving the subject of human capital, we should mention other studies that have looked at somewhat the same information from the opposite point of view—namely, studies that attempt to explain features of the income distribution on the basis of differences in education (generally assuming constant returns to educational investment). In a theoretical article, Mincer has shown that, on some quite plausible assumptions, the fact that different occupations require different amounts of training can be used to explain the well-known but mysteriously unsymmetrical shape of the distribution of personal income.[34]

Others have looked at education as an explanation of income differences between particular groups. Zeman, for example, found that differences in education went a long way toward "explaining" (in the statistical sense) the differences in income between white and nonwhites in the United States.[35] Friedman and Kuznets' efforts to explain differences in income between different professions on the basis of education have already been mentioned. A recent article by Keat focuses on the narrowing of wage differentials between skilled and unskilled workers which has occurred in this century and the possible role of education in explaining this phenomenon.[36] Keat indicates that the costs associated with apprenticeship to a skilled trade (mainly income forgone) are lower than they used to be, presumably because much of the training formerly given to apprentices is now acquired by almost everyone in school. If rates of return on these apprenticeship costs had been constant, one would have expected the differentials in later-life income between skilled and unskilled workers to have narrowed over time, which is exactly what has happened.

All this adds up to no more than a good start on a very difficult set of problems. After years of neglecting the obvious, economists have finally "discovered" investment in human beings. They have begun to think of the resources devoted to education as, at least in part, a type of investment, to be considered alongside other types of investment as a means of achieving economic growth. They have begun to look for ways of measuring this investment in education at cost and for ways of estimating its yield.

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[34] Jacob Mincer, "Investment in Human Capital and Personal Income Distribution," *Journal of Political Economy*, 66: 281–302, August 1958.

[35] Morton Zeman, *Quantitative Analysis of White-Nonwhite Income Differentials in the United States*, Doctoral dissertation, University of Chicago, 1955, ch. 4.

[36] Paul G. Keat, "Long-Run Changes in Occupational Wage Structure, 1900–1956," *Journal of Political Economy*, 68: 584–600, December 1960.

A great deal remains to be done. Much of it will be grubby, unglamorous work—digging out statistics and making estimates of gross and net investment in education and the value of the educational stock in the United States and other countries for a sufficient number of years to permit some real analysis. Very hard work will also have to go into obtaining better measures of the economic benefits of education both to the individual who gets it and to society as a whole. Estimating private returns is the easier problem, but we must have much better information on earnings according to type of education, ability, and other complicating factors before we can have much confidence even in these estimates. Estimating social returns is much harder and it will probably never be possible to do it very satisfactorily. Nevertheless the social returns must not be forgotten and an effort must be made to identify them and to find at least approximative ways of estimating their magnitude. This is absolutely necessary if economists want to give any guidance to policy makers on desirable levels of national investment in education.

II. Supply and Demand Problems: Students and Trained Manpower

The first question which those who make decisions about education generally want answered is: How many students do we have to plan for? What will enrollment be 5 or 10 years from now? Perhaps because college enrollment has grown rapidly and fairly steadily for a good many years, educators have come to think of it as having an inexorable trend of its own with which they have to cope, rather than as something under their control. They have clamored for enrollment projections on which to base their future plans, and the Office of Education and others have attempted to produce such projections. The usual method has been to estimate enrollment ratios (college enrollment as a percentage of the population in the college age group, sometimes broken down by sex) for the recent past, to fit a trend to these ratios and project it into the future, and then apply the projected ratios to estimates of the college-age population in future years.[37]

Such trend projections can be useful if they are not taken too seriously, but several things about them should be remembered. One is that the tendency of young people to go to college is influenced by their family income, their parents' education, their estimates of job opportunities, and so forth, not just by the march of time. Projecting a time trend in enrollment is therefore a substitute for trying to estimate the effect of changes in these other variables. Furthermore, enrollment projections cannot be very useful to decision makers until they are broken down into different types of enrollment (full time and part time, graduate and undergraduate, etc.). A beginning has been made toward recognition of variables in projections of enrollment, as illustrated by Conger's estimates in chapter 1 of this publication.

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[37] For some refinements of this method, see Louis Conger, ch. 1 of this publication. Earlier examples include: Fund for the Advancement of Education, *Teachers for Tomorrow* (Fund for the Advancement of Education Bulletin No. 2), November 1955; Educational Policies Commission, *Higher Education in a Decade of Decision*, Washington, the Commission, 1957, p. 31; Ronald B. Thompson, "Projected College Enrollments, 1950–1975" [by States], *College Blue Book*, ninth edition, 1959, p. 919–934.

Finally, and most important, enrollment itself depends on the policies adopted by educational institutions, particularly as to the level of tuition, the availability of scholarships and loans, the distribution of college facilities, and the type of education offered. When educators ask, "What is enrollment going to be?" they are really asking the wrong question. The right questions are, "What would enrollment be if certain policies were adopted?" and "What policies should be chosen in order to obtain the size and quality of college enrollment the Nation needs?"

Much effort has gone into studies of college going among high-school graduates in recent years, directed at finding out how many able students do not go on to college and why they do not.[38] In general, these studies have shown that the probability of a student's going to college is strongly related to his ability, his sex, and his parents' education or occupation. The nearness of a college also seems to exert a positive influence. These studies have not yielded much direct evidence on the influence of financial factors on college attendance, since little information has been collected on the income and assets of the students' parents or on how the college costs of the students that attend are financed.

A few surveys have been made of parents. One was directed at finding out how many parents expect their children to go to college, how much they think it will cost, and what plans they are making to pay the costs.[39] Another focused on the costs incurred by students actually or recently in college, the incomes of their families, and the ways in which the expenses were paid.[40]

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[38] The most important national study is reported in Charles C. Cole, Jr., *Encouraging Scientific Talent*, New York College Entrance Examination Board, 1956, and Educational Testing Service, *Background Factors Relating to College Plans and College Enrollment Among Public High School Students*, Princeton, N.J., April 1957, processed. There have been at least a dozen State studies, including: Ralph F. Berdie, *After High School—What?* Minneapolis, Minn., University of Minnesota Press, 1954; J. Kenneth Little, *Explorations Into the College Plans and Experiences of High-School Graduates; a State-Wide Inquiry*, University of Wisconsin, School of Education, September 1959; Wendell W. Wright *and* Christian W. Jung, Why Capable High-School Students Do Not Continue Their Schooling. *Bulletin of the School of Education*, Bloomington, Ind., Indiana University, Division of Research and Field Services, vol. 35, January 1959.

[39] Elmo Roper *and Associates*. *Parents' College Plans Study* (a report to the Ford Foundation), processed, 1959. *Also see* Brazer and David, ch. 2 of this publication.

These studies of college going, although numerous, have been of limited usefulness because most of the samples have been too small to support statistical analysis of several variables at once, and no one study has collected information both from the students and from their families.[41] Hence we are still a long way from being able to estimate the separate effects of ability, achievement, family resources, nearness of a college, costs of different kinds of colleges, and so forth, on the probability that a student will apply for college entrance, and from being able to use these estimates to make projections of what enrollment might amount to [illegible] certain policies were adopted. In other words, we have not succeeded in making useful estimates of what economists would call "the demand for college education."

We have been talking about the market for college education—a market in which potential students furnish the demand and colleges and universities furnish the supply. When the students complete their education most of them move on into a new market—the market for labor services—in which they are among the suppliers. A good deal has been written in recent years about "shortages" and "surpluses" in this market, not all of it enlightening.

Harris published a book in 1949 in which he predicted that by the end of the 1960's, there would be a substantial "surplus" of college graduates.[42] By this he meant that large numbers of college graduates would be seeking professional and executive jobs, would be unable to find them, and would have to settle for lower status jobs in which they would be underutilized and dissatisfied. Harris estimated that 70 percent of all employed college graduates in 1940 were in professional occupations. He assumed that 70 percent of future graduates would continue to seek professional employment. If they were forced into other occupations by lack of professional openings, they would constitute a "surplus."

Harris was right in predicting that as the number of college graduates increased, the proportion going into the professions would decline—a trend already discernible at the time he wrote. But there is no evidence that many of the college graduates now going into other occupations are disappointed seekers of professional jobs. What Harris did not foresee was the growing acceptance of college as preparation for a wide variety of occupations outside the professions and the accompanying shift in college curriculums toward preparation for these occupations—witness the growth of business education at the college level.

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[40] John B. Lansing, Thomas Lorimer and Chikashi Moriguchi. *How People Pay for College.* University of Michigan, Survey Research Center, September 1960. *See also,* Ernest V. Hollis. *Costs of Attending College.* U.S. Office of Education, Bulletin 1957, No. 9. Washington, U.S. Government Printing Office, 1957.

[41] Some of these deficiencies may be remedied by a study in progress at the University of Pittsburgh. This study, referred to as "Project Talent," is based on a large national sample of high-school students.

[42] Seymour E. Harris. *The Market for College Graduates.* Cambridge, Mass., Harvard University Press, 1949.

Even if college-trained persons in jobs outside the professions are not manifestly dissatisfied, one might question whether their education is being fully utilized. This suggests the possibility of trying to measure the amount of education required to operate the economy at its present level and comparing that amount with the education actually embodied in the labor force—a problem to which Eckaus addresses himself.[43]

Predictions of "surpluses" have been much less frequent in recent years than predictions of "shortages"—particularly predictions of shortages in particular professions such as teaching, medicine, and engineering. "Shortage" is an ambiguous term and has been used in several different senses, often without adequate definition.[44]

By a "shortage" of a particular type of manpower, an economist usually means a situation in which the demand for this type of specialist at current wages has suddenly increased so that some jobs are going unfilled. Unless there are wage controls or other restrictions imposed on the market, this situation will not persist for long. The firms or clients to whom these specialists are most valuable will bid them away from others and/or induce more of them to enter the labor market by offering higher wages. Firms or clients to whom it would not be profitable to pay the higher wages will have to reorganize their activities so as to use less of these specialists' services. To find a shortage in the economist's sense, one would look to see whether there were large numbers of positions open at current salaries which could not be filled, and then one would inquire what kinds of artificial restriction or market stickiness were preventing the pay from rising and eliminating the "shortage" by attracting a larger supply of specialists and allocating them to activities in which they were most valuable.

The word "shortage," however, frequently appears in the literature in quite a different sense, meaning a situation in which there are fewer of a particular type of specialist than the person alleging that a shortage exists thinks there *ought* to be. By "teacher shortage," for example, most people do not mean that there are many unfilled positions at current salaries, but that the positions are filled with persons who are not as qualified as they should be or who are teaching a larger number of students than is pedagogically desirable. Those who predict future shortages in particular professions usually mean that if present rates of entry into the profession continue, there will not be as many doctors per thousand population or as many college professors per thousand students as they believe there should be.[45] This meaning of "shortage" should be carefully distinguished from the usual economist's meaning because the remedy for it is quite different. This "shortage" will not disappear if the market mechanism is allowed to operate freely. That mechanism may be operating very well indeed. The "shortage" will only diminish if the demand for the specialists increases enough to bring about an increase in their pay and to call forth an increased supply. The "teacher shortage" will be abated only if society decides to devote more resources to hiring teachers, and whether or not it will do this depends on how it values this use against other uses of the same resources.[46]

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[43] Richard S. Eckaus. Ch. 8 of this publication.

[44] For a discussion of various possible meanings and their implications, *see* A. A. Alchian, K. J. Arrow, *and* W. M. Capron. *An Economic Analysis of the Market for Scientists and Engineers.* Santa Monica, Calif., The Rand Corp., processed, June 1958.

The word "shortage" has been used in a third sense, indicating any situation in which the wages of a particular group are rising, so that a given sum of money does not purchase as great a volume of their services as it used to. This is a rather unfortunate use of the word, but a few economists have adopted it. Blank and Stigler, for example, defined a shortage as a situation in which the "number of workers available [the supply] increases less rapidly than the number demanded *at the salaries paid in the recent past*" [their italic], and hence salaries are rising.[47] Applying this standard, Blank and Stigler found that there had been no "shortage" of engineers in the period 1929-54. In fact, engineers' salaries had declined relative to those of all workers and to those of some other professions. However, Hansen has reexamined this and more recent evidence and he indicates, among other things, that a substantial Blank and Stigler type "shortage" of engineers, especially those starting in their profession, did develop between 1953 and 1958.[48]

The reason the Blank and Stigler use of the term "shortage" seems unfortunate is that "shortage" is definitely a pejorative word. If one alleges that there is a "shortage" of something, one is implying that there is some misallocation of resources, which should be corrected. But a rise in wages is no evidence of that. Indeed, it is through changes in wages and prices that a free market operates to insure optimum resource allocation.

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[45] For examples of this type of manpower projection, *see* Dael Wolfle, *America's Resources of Specialized Talent* (The Report of the Commission on Human Resources and Advanced Training), New York, Harper & Bros., 1954; Fund for the Advancement of Education, *Teachers for Tomorrow* (Fund for the Advancement of Education Bulletin No. 2), 1955; and National Manpower Council, *A Policy for Scientific and Professional Manpower*, New York, Columbia University Press, 1953, ch. 7–11.

[46] For a discussion of these points, *see* Procter Thompson, "Manpower Allocation and the Pricing Process," *Journal of Political Economy*, 63: 441–445, October 1955.

[47] David M. Blank *and* George J. Stigler, *The Demand and Supply of Scientific Personnel*, New York, National Bureau of Economic Research, 1957, p. 24.

[48] W. Lee Hansen, "The 'Shortage' of Engineers," *Review of Economics and Statistics* 43: 251–256, August 1961.

Here again, economists have just made a start on some very difficult problems. They have begun, belatedly, to apply the useful tools of supply and demand to the market for college educations and the market for college-educated people. But a great deal more work needs to be done before we can gain much understanding of how these two markets work or of the interrelations between them, and before we can use this understanding accurately to predict the effect of policy changes on the numbers of persons seeking higher educations or the job opportunities that will confront them.

III. Financing of Higher Education

American higher education is financed in an extremely complicated fashion. Anyone who is not already impressed by this should try explaining it to a foreigner. Our system, if it can be described as a "system," consists of nearly 2,000 institutions of widely different types, supported by various combinations of student fees, gifts and grants from private sources, and subventions from at least three levels of government. Ideally, economists would like to be able to provide answers to two sets of questions—questions about how the present system works and questions about the probable advantages and disadvantages of shifting to different methods in the future.

Even the first set of questions is hard to answer. The main source of information on where the money for higher education comes from and how it is spent is the Office of Education's *Biennial Survey of Education*. This provides some facts about the amounts obtained by higher educational institutions from different sources (student fees, Federal payments for research, State governments, etc.) and the broad categories of expenditure to which the funds are devoted (instruction, organized research, libraries, etc.). Although the categories are broad and may not be consistently interpreted in different years by different institutions, the Biennial Survey data provide a useful starting point for studying higher educational finance, and it is surprising that they have not been analyzed more thoroughly than they have.

For example, the Biennial Survey data have received only limited examination on a State-by-State basis. In 1952 the Council of State Governments published a useful volume, based primarily on the Biennial Survey, giving State statistics on income and expenditures of educational institutions, by sources of funds and type of institution, as well as information on enrollments, migration of students, and other subjects. Unfortunately, the last year covered by these tables was 1950 and no attempt has been made to keep them up to date.[49]

Some State-by-State comparisons were made by Hungate, using 1951-52 data.[50] He produced tables showing State rankings in expenditures for resident instruction per full-time equivalent student and per college-age person in the State population and in relation to State income. He also studied the financial implications of student migration, indicating which States were "deficit" States—in the sense that they spent less on the education of out-of-State students than other States spent on the education of the students from deficit States.

A more detailed study of higher education expenditures and sources of income by States (1957-58) was made by Mushkin and McLoone for 16 States.[51] They separated out amounts spent by higher educational institutions in actually educating students (as contrasted with other activities) and compared the States with regard to the amount of such expenditures per college-age person in the State and per full-time equivalent student. They examined the sources of such funds in the different States and noted especially the extent to which students and their families contributed through tuition payments and the amount of tax support. They included some information on the tax support of private institutions and State scholarship aid to students, and related both the tax support and the private contributions in the 16 States to per capita personal income.

This kind of basic statistical analysis of public and private efforts to finance higher education in relation to needs and resources is useful and ought to be available for all States on a regular basis.

The role of the Federal Government in financing higher education has recently attracted particular attention, and considerable research effort has been devoted to studying Federal programs that affect higher education and in trying to establish what their impact has been. The American Assembly held a session on "The Federal Government and Higher Education" in 1960 and published a volume of background papers giving a brief history of the Federal programs and discussing some of the issues they raise.[52]

The Carnegie Foundation for the Advancement of Teaching is currently supporting a study on the relationships of the Federal Government with higher education, directed by Reuben Gross. About

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[49] Council of State Governments. *Higher Education in the Forty-eight States.* Chicago, the Council, 1952.

[50] Thad L. Hungate. *A New Basis of Support for Higher Education.* New York, Teachers College, Columbia University, 1957.

[51] Selma J. Mushkin *and* Eugene P. McLoone. *Student Higher Education; Expenditures and Sources of Income in Sixteen Selected States.* Washington, D.C., National Planning Association, 1960, processed. *See also* Selma Mushkin, ch. 14 of this publication.

[52] Douglas M. Knight, *ed.* *The Federal Government and Higher Education.* The American Assembly. Englewood Cliffs, N.J., Prentice-Hall, 1960.

20 representative institutions are participating in the study, providing information on the amount and type of Government support they receive according to department, the extent to which their faculty members are involved in federally financed programs, the criteria used in accepting or rejecting Government money, and other subjects. A report on this study is expected in 1962.

The U.S. Office of Education is also engaged in a review of Federal programs, with J. Kenneth Little of the University of Wisconsin in charge of the review. Under this program the Office is supporting a study by Harold Orlans at the Brookings Institution on the impact on higher education of Federal activities. As in the Carnegie Foundation study, information is being collected from a group of representative colleges and universities. The emphasis is on ways in which Federal activities have affected the quality of education, especially the teaching of undergraduates, and the extent to which greater use could be made of colleges and universities that are not now participating to any great extent in Federal programs.

Two other general studies of the Federal Government and its relations to higher education have recently been completed; one by Homer D. Babbidge, Jr., and Robert Rosenzweig (to be published in 1962); and one by the author of the present chapter.[53] Both of these have used information obtained mainly from Federal sources, rather than data collected from the colleges and universities themselves.

While these various studies of Federal activities in higher education have somewhat different emphases, it is clear that there has been some duplication of effort here and that more might have been learned with the same expenditure of time and money if there had been better communication among the organizations supporting research in this field. It is also clear that many questions remain unanswered, largely because no one can say what would have happened to American higher education in the absence of Federal programs.

By comparison the effort devoted to comprehensive study of State and local financing of higher education seems to have been disproportionately small. Many States have recently made studies of their own higher education systems, some covering all the institutions in the

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[53] Alice M. Rivlin, *The Role of the Federal Government in Financing Higher Education*, Washington: Brookings Institution, 1961. In addition to these general studies, there have been a number of more intensive studies of the development and functioning of particular types of Federal activities affecting higher education. *See*, for example, Charles V. Kidd, *American Universities and Federal Research*, Cambridge, Mass., Harvard University Press, 1959; Edward D. Eddy, *Colleges for Our Land and Time; The Land Grant Idea in American Education*, New York, Harper & Bros., 1957; Gene M. Lyons and John W. Masland, *Education and Military Leadership: a Study of the ROTC*, Princeton, N.J., Princeton University Press, 1959. *See also* Roy E. Moor, ch. 13 of this publication.

State and some just those receiving State support.[54] These studies are of varying quality, but many of them contain information about costs of providing different types of higher education and the ways in which State and local governments contribute to these costs—the use of earmarked taxes and general appropriations, criteria for apportioning State money, forms of aid to private institutions, etc. No one has tried to bring together the data presented in these studies to form a national picture, or to fill in the gaps by obtaining information directly from the States.

Many of the State studies contain projections of higher educational "needs" 10 or 15 years in advance, with recommendations on how to meet these needs, and there have been some attempts to make this type of projection on a national level.[55] Typically, needs have been estimated by taking one of the trend-type enrollment projections mentioned earlier in this paper, making an arbitrary assumption about costs per student, and multiplying one by the other. Then amounts to be expected from sources such as tuition payments and contributions by private philanthropy are roughly estimated and the rest of the check is assumed to be picked up by some level of government. The amount expected from private sources may reflect, implicitly or explicitly, the views of the person making the projection about how much of the burden of higher education ought to be borne by such sources.

Making projections is a hazardous art at best, but clearly necessary to rational planning. It would be useful for someone to do a more thorough and better documented job of projecting costs of higher education and revenues for meeting them than has been done to date. The effect of specific assumptions about the future on the projections should be indicated; for example, of alternative enrollment projections, of different proportions of full-time and part-time students, of different proportions in junior colleges and other types of institutions, of alternative assumptions about class sizes, faculty salaries, and other components of costs. It should not be forgotten that enrollment itself will be affected by the means of financing (especially by the level of tuition) and by the type of facilities provided, and that costs per student may be affected by the size of enrollment.

Considerable effort has gone into estimating the capacity of the States to meet future demands for public services in general and public education in particular, often as a background for deciding whether or not increased Federal aid to the States would be desirable.[56] Higher education by itself, however, is a small item in State and local budgets, compared with elementary and secondary education or roads or welfare programs. Hence expenditures on higher education by State and local governments need not be closely related to their overall fiscal capacity, but depend on the priority assigned to higher education in the hierarchy of State and local needs.

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[54] Council of State Governments. *Reports on Higher Education: An Annotated Bibliography of Recent Reports of State Study Commissions and Other Official Agencies.* Chicago, the Council, March 1958, processed. More recent ones are listed in the Office of Education's monthly publication, *Higher Education.* *See also* Selma J. Mushkin, ch. 14 of this publication.

[55] *See* Dexter M. Keezer, *ed.* *Financing Higher Education, 1960–70.* New York, McGraw-Hill Book Co., 1959, especially the papers by Seymour E. Harris *and* Robert D. Calkins; *also* Council for Financial Aid to Education, *Where's the Money Coming From?* New York, the Council, 1959.

One study of State and local taxes, however, should be mentioned here because of its specific focus on higher education. Pitchell of the Bureau of Government Research at Indiana University is conducting a study of State and local taxes in a group of representative States, with the object of determining the extent to which corporations support State institutions of higher education through their payments of taxes. He is endeavoring to estimate the portion of State and local taxes (exclusive of some earmarked for specific purposes) which are paid by corporations and the portion of these taxes that go to support higher education.[57]

Lastly, mention should be made of a few of the many recent proposals for altering the means of financing education, especially higher education. One of the most frequent proposals involves changing the Federal tax laws to allow parents to deduct part or all of the college expenses of their children from their taxable income or even from their Federal tax liability.[58]

A much more fundamental change in the tax treatment of education has been proposed by Goode.[59] He points out that the Federal income tax discriminates against persons who choose to invest in themselves through education rather than in physical capital. He suggests that the student himself be allowed to write off the costs of certain kinds of education against his taxable income over a period of years, just as he is presently allowed to write off investment in physical capital goods.

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[56] For general studies of State capacity, *see* Selma J. Mushkin, "The Fiscal Capacity of the States," National Tax Association, *Proceedings of the Fifty-first Annual Conference*, 1958, p. 297–306; Dick Netzer, The Outlook for Fiscal Needs and Resources of State and Local Government, *American Economic Review*, 48: 317–327, May 1958. For specific focus on education, *see* Procter Thomson, "Federal Aid to Public Education," a Study Prepared for the Committee for Economic Development, January 1959 unpublished; Seymour E. Harris, *More Resources for Education*, New York, Harper & Bros., 1960; Jesse V. Burkhead, Financing Education, *American Economic Review*, vol. 47, May 1957. Burkhead has a study in progress at Syracuse University entitled "State and Local Tax Bases for the Support of Education."

[57] *See* Robert J. Pitchell, ch. 15 of this publication.

[58] John F. Meck, The Tax Credit Proposal, in Seymour E. Harris, *ed.*, *Higher Education in the United States, the Economic Problems*, Cambridge, Mass., Harvard University Press, 1960, p. 93–95; Homer W. Turner, The Prospects for Private-Sector Support of Higher Education, in Dexter M. Keezer, *ed.*, *Financing Higher Education 1960–70*, New York, McGraw-Hill Book Co., 1959, p. 248–250.

[59] *See* Richard Goode, ch. 17 of this publication.

Among the many other tax proposals is Robert Heller's suggestion to encourage State and local governments to raise taxes for education by allowing individuals to deduct these increased payments from their Federal income tax.[60]

Harris has argued for substantial increases in tuition at both private and public educational institutions, accompanied by greater reliance on student borrowing.[61]

Friedman and Vickrey separately have made suggestions for encouraging students to borrow to finance their education by allowing them to repay a percentage of their future income rather than a fixed sum with interest.[62]

In addition, there has been an abundance of less original, but presumably more feasible proposals for expanding or otherwise altering existing programs of scholarships and loans, Federal and State grants, etc. Unfortunately, the legislators who must act on these proposals are seldom given more than sketchy guesses about their possible effects on higher education and its distribution. Economists have a great deal more work to do before they are able to provide projections of the probable effects of alternative policies so that appropriate decisions on the financing of higher education can be made.

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[60] Robert Heller. A Proposal for Financing Tax Supported Education. *Harvard Educational Review*, 28 : 214-215, summer 1958.

[61] Seymour E. Harris. Charging the Student Tuition on the Basis of Costs. *Educational Record*, 40 : 24-29, January 1959; and College Salaries, Financing of Higher Education, and Management of Institutions of Higher Learning. *Bulletin of the American Association of University Professors*, 44 : 559-595, summer 1958.

[62] Milton Friedman. "The Role of Government in Education." In Robert A. Solo (*ed.*), *Economics and the Public Interest*. New Brunswick, N.J., Rutgers University Press 1955; *and* William Vickrey, ch. 16 of this publication.

APPENDIXES

APPENDIX A

Summary of the Sampling Procedures Used in "Patterns of Family Change" Study

Harvey E. Brazer and Martin David

THE MAJOR OBJECTIVES of the study "Patterns of Family Change" required a versatile sample of the United States population which would meet three major requirements. First, the sample was to provide reliable data on a group of families with relatively low incomes. For these families the study attempts to determine causal factors related to their income position, aspirations of the family, the probability that their children will receive an adequate education, and the attitudes that might be related to planning horizons, dependency, and achievement motivation. Second, the sample was to provide a group of middle- and high-income families whose aspirations, attitudes, and accomplishments could be compared with those of the low-income group. This would establish the extent to which differences in these attributes were connected with income position. Third, the sample was to provide an unbiased representation of all families in the United States for the purpose of determining the distribution of nonmoney income, property taxes, benefits from public education, and other measures which were developed in this study or which have not been available for a cross section of the United States population for some time.

These three requirements for the sample can be achieved by a variety of sampling plans. The sample design selected included interviews with a cross section of the United States and supplementary interviews with low-income families. The supplementary interviews were chosen in such a way that they could be combined with the cross-section interviews by suitable weights.

The low-income families are thus represented by twice as many interviews, reducing sampling errors of statements made about them, but these interviews have weights half the size so that they do not dominate and bias statements about the whole population, or about groups containing both low and high incomes.

In fact, the weights also adjust for differential response rates in substrata of the sample, reducing possible bias from this source as well.

We chose to oversample families with a spending unit head of working age (under 65) whose per capita income was low:

If the family contained—	*Selection was made of those whose total family income was less than—*
1, 2 or 3 members	$2,000
4 or 5	3,000
6 or 7	4,000
8 or more	5,000

The criteria for choosing low-income families selected approximately one out of every eight families for the low-income supplement. The supplement was chosen from the 1960 Survey of Consumer Finances which interviewed about 2,800 families. When nonresponse is taken into account, the supplement thus yielded interviews with spending units in about 300 families. A new, independent cross-section sample was drawn and added to bring the total sample to approximately 3,000. It was felt this sample would be sufficiently large to provide reliability in estimating the relationships which were of interest to the researchers.

The cross-section samples for both the Patterns of Family Change Study and the 1960 Survey of Consumer Finances were selected from the Survey Research Center's national sample of dwellings.[1] This

TABLE 1.—Sample size, interviews and noninterviews by spending unit and family classification for the cross section and reinterview sample

Item	Cross section sample		Reinterview sample	
	Number	Percent	Number	Percent
Occupied dwellings	3,013		361	
All spending units	3,390	100.0	[2] 390	100.0
Interviews	2,692	79.4	305	78.2
Noninterviews	698	20.6	85	21.8
Refusals	360	10.6	26	6.7
Respondents not at home, and noninterviews for other reasons	338	10.0	59	15.1
All families	[1] 3,095	100.0	[3] 427	100.0
Interviews	2,513	81.2	296	69.3
Noninterviews			90	21.1
Refusals	326	10.5	36	8.4
Respondents not at home, and noninterviews for other reasons	256	8.3	54	12.7
Families not selected in the sample [3]			41	9.6

[1] Includes 8 cases which have double weights because they were selected at half the sampling rate. Includes 1 case which was eligible for both the cross section and reinterview samples. Thus the actual number of families interviewed is only 2,800; i.e., [(2513−9)+296].

[2] 63 spending units who were interviewed are included in the nonresponse because interviews with other spending units in the family were not completed. Failure to complete interviews with all spending units in a family made it impossible to estimate the family income and several other critical financial variables.

[3] Reinterview response rates shown for family units include an estimate of the number of low-income families who were never contacted during the first wave of interviewing on the 1960 Survery of Consumer Finances. These families could not be selected for the reinterview sample as no information was available.

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[1] A detailed description of this national sample is available on request from the Survey Research Center, University of Michigan, Ann Arbor.

is a multistage, area probability sample that gives equal chance of selection to dwelling units in the 48 States.[2]

Dwellings on military reservations are excluded from the universe. Also excluded are persons living in large rooming houses, residential clubs, and hotel rooms; inmate quarters or other institutional accommodations not qualifying as dwelling units; and other similar places.

Figures on actual sizes of the cross-section and reinterview samples, numbers of interviews and noninterviews by spending units and families are summarized in table 1.

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[2] For the dwelling unit definition, *see* U.S. Department of Commerce, Bureau of the Census, *1950 Census of Housing*, vol. I, pt. I, p. xvi.

APPENDIX B

A Calculation of Income Forgone by Students: Supplement to "The Nation's Educational Outlay"

Rudolph C. Blitz

I. Schultz' Method of Calculation

IN A RECENT PAPER Prof. Theodore W. Schultz estimates by an ingenious method the earnings forgone on the part of high school and college students during the years 1900, 1910, 1920, 1930, 1940, 1950, and 1956.[1] His procedure involves the following steps:

He assumes that there are no earnings forgone on the part of students while attending the first eight grades. Because of the availability of certain key data, he takes 1949 as the base year for his calculations. Treating separately male students and female students in high school and in college and using four age groups, 14–17, 18–19, 20–24, and 25–29, he takes the actual earnings of each of these age groups and estimates from census data that show the proportion of each group that worked a certain number of weeks per year, and the average weekly income earned by each age-sex group. He assumes also that students have to forgo on the average 40 weeks of such earnings, and he therefore estimates that in 1949 a high school student had to forgo $583, and a college student $1,369. He then expresses these forgone earnings in terms of the average weekly earnings of workers in manufacturing in the United States in 1949, which amounted to $54.92. This means that a highschool student had to forgo the equivalent of 11 weeks of average earnings in manufacturing, and a college student the approximate equivalent of 25 weeks of average earnings. Assuming that the same relationship prevails between (1) the earnings of the various age groups that make up the high school and college population and (2) the average earnings in manufacturing, Schultz calculates the income forgone by students for each of the 7 years previously mentioned. Thus, according to his calculation, in 1956 the average high school student, while in school, had to forgo $881, and the average college student $2,003.

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[1] Theodore W. Schultz, Capital Formation by Education, *Journal of Political Economy*, 68: 571–83, December 1960.

In this method there appears to be a downward bias, especially for the younger age groups. The main causes of the downward bias are discussed briefly.

First, the most important sources for Schultz' findings are two special census reports of 1950, one on *Employment and Personal Characteristics* and the other on *Education*.[2] One gives a percentage distribution of the persons in different age groups who in 1950 worked 1 to 13 weeks, 14 to 26 weeks, and so forth, and the other gives the median income in 1949 of persons 14 years old and over, by years of school completed. These census data do not separate earnings of casual workers from those of regular workers. Since three-quarters of the population of high-school age are actually in high school, the majority of them hold only casual jobs and do not realize their full potential in the labor market, and this in turn will cause a downward bias.

Secondly, most of the casual workers, who are attending school at the same time, are not working a full 40-hour week, but considerably less than 40 hours; yet the census calculation of "median weekly earnings" makes no allowance for this.

Thirdly, even if we had, for the population of high-school age, separate data on the median income of the "casuals" in the labor market (the actual high-school population) and on that of workers employed full time (50 weeks or up) who do not attend school, a calculation of income forgone by the students on the basis of the income earned by nonstudents would still contain a downward bias. This could occur because racial and environmental factors or the lower intelligence of the full-time workers of high-school age will reduce their income potential in comparison with that of students.

Fourthly, in the case of students the casualness is especially bunched during the summer months. In earlier years long summer vacations were largely justified by the seasonal needs of farms. With progressive mechanization of agriculture, the needs for casual agricultural labor have probably decreased, but the proportion of young persons of high-school and college age who are actually attending school is growing. It is therefore likely that comparison of the incomes of the casually and the permanently employed high-school and college age population is becoming more and more unfavorable for the casual workers who are actually attending school.

Fifthly, Schultz calculates the income forgone by the school population by multiplying the median income of each group by the number of students in the group. This procedure, however, is bound to introduce a further downward bias, since for income-distribution data the mean is generally above the median. At the same time, the mean would appear to be the appropriate measure for calculation of the income forgone by students as the mean represents the total income of the group divided by the number in the group.[3] In computing the arithmetic mean from the income-frequency distribution in the estimates presented below the problem of open-end distributions was met as follows: If the lower end of the distribution was open, the midpoint was set after consideration of such factors as overall distribution, type of employment, and income supplements such as tips. If the upper end was open, Pareto's income law was used to determine graphically the midpoint of the highest group.[4]

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[2] It is unnecessary to describe here in any detail the source and nature of various auxiliary data used by Schultz, because they have no effect on the biases under consideration.

II. Empirical Studies

Drawing on five studies of actual earnings of the school-age population, an attempt is made here to ascertain the historical trends in such earnings as a basis for estimating earnings forgone by those in school.[5]

Empirical studies used for comparison with Schultz' calculations

Years for which data are given	*High-school age*	*College age*
1899–1923	Brissenden study	
1907	1907 study	
1947	Louisville study	
1956	Harrison County (W. Va.) study	Indiana study.

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[3] EDITOR'S NOTE:

Professor Schultz in commenting on an earlier draft of this study noted that four factors were omitted from his analysis of *Capital Formation by Education:* namely, (*a*) differences in ability and earning capacity between young people of school age at work and those of similar age in school, (*b*) the lower earnings levels of young persons in the labor force for brief periods only, (*c*) earnings of the students while they attend school, (*d*) the higher unemployment rate among young people than in the labor force as a whole. The first two of these factors "would increase earning forgone and two would decrease them." Schultz pointed out that in the study presented here, account is not taken of the factors which tend to decrease average earnings forgone, particularly "earnings from jobs that many students hold while they attend school—earnings that are not forgone." The earnings surveys on which the present study draws also generally do not reflect the lower earnings of agricultural workers.

[4] For a discussion of this method, *see* R. G. D. Allen. *Mathematical Analysis for Economists*. London, Macmillan Ltd., 1956. p. 222, 401–408.

[5] These five sources are: (1) P. F. Brissenden. *Earnings of Factory Workers*, 1899–1927, Census Monograph No. 10. Washington, D.C., 1929 (referred to hereafter as the Brissenden study). (2) *Report on Conditions of Women and Child Wage Earners in the United States* (in 19 volumes). Vol. 7, "Conditions Under Which Children Leave School To Go to Work," S. Doc. No. 645, 61st Congress, 2d sess. (referred to hereafter as the 1907 study). (3) U.S. Bureau of Labor Standards, "Hunting a Career, a Study of Out-of-School Youth in Louisville, Kentucky," Bureau of Labor Standards, Bulletin No. 115, Washington, 1949 (referred to hereafter as the Louisville study). (4) Naomi Riches, "Education and Work of Young People in a Labor Surplus Area," *Monthly Labor Review*, 80: 7, December 1957 (referred to hereafter as the Harrison County (W. Va.) study). (5) Wendel W. Wright and Christian W. Jung, "Why Capable High School Students Do Not Continue Their Schooling," *Bulletin of the School of Education*, Indiana University, vol. 35, January 1959 (referred to hereafter as the Indiana study).

These studies indicate that the income forgone by high-school students is substantially larger than was calculated by Schultz, the difference in estimates of income forgone by college students, is not as great as for high-school students. Schultz' calculation of income forgone by high-school students is more affected by downward biases than is his calculation concerning college students. However the data drawn from the empirical studies include agricultural earnings with the exception of the Indiana study.[6] Particularly in earlier years a very large proportion of children were employed in agriculture. It is conceivable that the discrepancy between Schultz' estimate and the data of these empirical studies could be explained by the difference in earnings between children in agricultural and other jobs in agriculture are substantially lower than their wages in other occupations, and a large proportion of employed children historically were in agriculture, the wages reported in the four studies that exclude that occupation are higher than the income data used by Schultz.[7] Unfortunately we have been unable to discover any systematic study of children's earnings in agriculture. The problem is sufficiently important, however, to justify a few brief comments.

In spite of the large proportion of young people employed in agriculture, less than 10 percent of the total labor force were in agricultural employment in 1956 and only 23 percent of persons aged 15-24 were living on farms.[8] These figures are relevant to the understanding of a hypothetical situation in which the entire high-school and college population would be in the labor force. Although it is difficult to gain an accurate conception of such a situation, these figures suggest that, if the entire student body entered employment, the proportion employed in agriculture would be smaller than the proportion of employed young people in agriculture today. The fact that the latter proportion is so large may be explained in part by the relatively low agricultural incomes, which causes young people living in rural areas to seek early employment. Other factors accounting for this phepromotion may be the institution of the family farm and the lax enforcement of school attendance laws in many rural areas.

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[6] The Brissenden study is limited to manufacturing; the 1907 study includes all industries except agriculture; the Louisville study and the Harrison County study cover trade and service industries and manufacturing.

[7] Even as late as April 1947 one half of the employed juveniles of 14 and 15 years in the United States were in agriculture, and a fourth of those 16 and 17 years, according to Elizabeth S. Johnson in "Employment Problems of Out-of-School Youth," *Monthly Labor Review*, 65: 673, December 1947. The *Current Population Report* of January 1956 (Series P-50, No. 64), p. 8, states that in October 1955—a month of high demand for agricultural labor—one third of the employed boys 14–17, both enrolled in school and not enrolled, were employed in agriculture. Of the employed 18- and 19-year olds, 13.8 percent went in agriculture and enrolled in school, and only 9.6 percent of those not enrolled in school. For more detailed information on the proportions of adolescents employed in agriculture between 1870 and 1930, *see* U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1940, and *Comparative Occupation Statistics for the United States, 1870–1940*, Washington, D.C., 1943, p. 97.

[8] *Statistical Abstract of the United States, 1959*, p. 24, 219.

THE BRISSENDEN AND THE 1907 STUDIES

The Brissenden study of the earnings of factory workers between 1899 and 1927 gives figures on the average earnings of children under 16 in the years 1899, 1904, 1909, 1914, 1919, 1921, and 1923. On the basis of payroll statistics published in the *Census of Manufactures* and of other data, Brissenden estimates full-time annual earnings for various age-sex groups based on a 51-week year. I have chosen to use his estimate of "full-time annual earnings" rather than of "actual earnings," that is, full-time earnings corrected for unemployment, since the former figure is comparable with Schultz' "unadjusted" figures.

Data reported in the 1907 study are from a Department of Commerce and Labor survey of 622 children between 7 and 17 years of age in two Northern and two Southern States, who had left school and were employed. Their median age was 14. They were employed in a wide variety of manufacturing, trade, and service industries; the majority, 56.5 percent, worked in the textile industry. In 1907 the weighted average weekly wage of these boys and girls was $4.41.

In the following table, figures on annual earnings of children, quoted from these two studies, are compared with Schultz' figures for the years in question.

TABLE 1.—Earnings forgone while attending high school, as calculated by Schultz, compared with such forgone earnings as reported in two empirical studies, selected years, 1899-1923

Year	Average weekly earnings, all manufacturing [1]	Annual earnings forgone while in high school (Schultz) [2]	Annual earnings forgone while in high school, based on two empirical studies [3]*
1	2	3	4
			BRISSENDEN STUDY
1899	8.19	90.09	140.40
1904	9.17	100.87	156.80
1909	9.96	109.56	174.00
1914	11.15	122.65	191.20
1919	22.27	244.97	382.00
1921	22.69	249.59	390.00
1923	24.12	265.32	411.60
			1907 STUDY [4]*
1907	10.04	110.44	176.40

[1] *Historical Statistics of The United States, 1789-1945*, a supplement to *Statistical Abstract of the United States, 1949*, Series D, p. 134-144.

[2] Col. 2 totals multiplied by 11, equivalent weeks of manufacturing earnings.

[3] For 1899-1923: P. F. Brissenden, *Earnings of Factory Workers, 1899-1927*. Census Monograph 10 Washington, D.C., 1929, p. 94.

[4] *Report on Condition of Woman and Child Wage Earners in the United States*, vol. 7, op. cit., p. 159-160.

*NOTE.—For complete comparability with Professor Schultz' findings, only the earnings of children 14-17 should be included. However, Brissenden does not give income data by age, but simply for "children under 16." In the 1907 study, wage data are given by age. For consistency, we have not used this clarification in the body of the table. The text says that the children studied in 1907 ranged in age from 7 to 17, and it is probable that Brissenden's age figures cover a similar range. The average weekly wage of children 14-17 in the 1907 study was $4.60, or $184 for the 40-week period.

For each year the empirical studies give a figure for income forgone that is more than 50 percent higher than Schultz' figure for the same year.* In evaluating the results, however, a number of points should be kept in mind.

Different methods are used by Brissenden and Schultz in the construction of the wage series on which the figures are based, and these differences account for about half of the variation in findings. The series on average wage in manufacturing which Schultz uses in his calculation of income forgone is taken from a study by Paul H. Douglas, in which Douglas also compares his method with that of Brissenden.[10] Because of differences of method, Brissenden's figures are for the years used here consistently about 23 percent higher than Douglas' figures. The figures we have taken from the Brissenden study are, however, for the various years between 55 and 59 percent higher than those of Schultz. This explanation does not apply to the 1907 study. The data on children's wages presented in that report were obtained by direct questioning and do not depend on any estimation procedure. For this reason it is particularly interesting to note how consistent the 1907 figure is with the figures from Brissenden's study. The 1907 figures are, in fact, 60 percent higher relative to Schultz' figures and thus, slightly higher than are Brissenden's.[11]

THE LOUISVILLE STUDY AND INCOME FORGONE BY HIGH-SCHOOL STUDENTS

The Louisville study, made in the spring of 1947, contains much information on the very youngest workers in full-time employment; that is, of the 14- to 16-year-olds. The study has the additional advantage that the proportion of whites to Negroes in Louisville is close to the national average.

Almost half of the school dropouts had withdrawn because of some dissatisfaction with the school environment or because of discouragement about poor grades; only about 20 percent had withdrawn primarily for economic reasons. This indicates that these very young full time workers constituted an academically inferior group for this age cohort, not a representative group. The intellectual, scholastic, and economic contrast between the dropouts and the students who remained in school is brought out more clearly in the Harrison County study, to be discussed subsequently.

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*In calculating income forgone by students, I followed a procedure adopted by Schultz: namely, to calculate income forgone on the basis of 40 weeks. This assumes, of course, that students are unable to earn an income for 40 weeks because they are preoccupied with studies for this period; they are able to earn income for 11 weeks and 1 additional week is lost because of holidays.

To the extent students hold part-time jobs during the year, this framework exaggerates the income forgone. To a certain extent, however this double counting is corrected: Many of the students cannot obtain employment for all of the summer, as we assumed. Their seasonal unemployment is really the result of being in school for the rest of the year. (See the *Baltimore Sun*, July 11, 1960, p. 1.)

[10] Paul H. Douglas. *Real Wages in the United States, 1890-1926*. Boston, Houghton Mifflin Co., 1930.

[11] Both the Brissenden study and the 1907 study use the arithmetic mean rather than the median. This may account for some of the difference between the estimates based on these studies and Schultz' findings. For a discussion of the method of computation, *see* p. 25-30 of the 1907 study and p. 269-286 of the Brissenden study.

The mean incomes listed here were computed from the data arrived at through interviews with a sample of 524 boys and girls who were out of school and in the labor market.

Earnings of juveniles, Louisville study[1]

Age	*Mean income*	*Percent of universe in sample*
14 and 15 years	$18.32	55
16 and 17 years	28.76	7
18 and 19 years	31.36	4

[1] Data from *Hunting a Career*, op. cit., p. 7, 47. 40 percent of the oldest group had actually graduated from high school, but of the youngest group almost 90 percent had not gone beyond the 8th grade (ibid., p. 20). At the time of the survey, unemployment among these youngsters was heavy. It is probable that the "intensity of jobseeking" in this group was considerably below the average intensity that prevails among the rest of the labor force, since over 90 percent of full time workers of high school age live at home.

If we now use the Louisville study for the calculation of income forgone by high-school students in 1956 and compare the findings with Schultz', the following factors should be considered: (1) The Louisville study represents a potentially low-wage group, which is not representative of the high-school population of the United States. (2) The sample contained a preponderance of girls over boys of about 20 percent, but in the actual aggregate high-school population of the United States the ratio of boys to girls is about even.[12] (3) Of the highest age group, 40 percent were high-school graduates. No good method could be improvised to correct for this. However, the upward bias this may cause can only be very minor. Of the aggregate high-school population of the United States, only 7.3 percent were 18 and 19 years old, so that the oldest age group will have a very light weight in our calculation.

Applying the age weights just cited we obtain from the Louisville study an average weekly wage per high-school student of $23.50 for 1947; for the same year Schultz' estimate of the average weekly wage would come to $13.75. From 1947 to 1956, average wages in manufacturing increased from $49.97 to $79.99, or 60 percent.[13] Assuming then, as Schultz does, a proportionate increase in the income of the high school population, we obtain for this group an average 1956 weekly wage of $37.60, or an annual income, based on 51 weeks, of $1,918.[14] This compares with Schultz' figures for the same year of a weekly wage of $22 under assumption of full employment, or $21.38 allowing for a 5 percent incidence of unemployment. The Louisville study therefore yields a figure for income forgone that is 70.7 percent higher than Schultz' full-employment figure. Income forgone per student, calculated on the basis of 40 weeks, would come to $1,504 compared to Schultz' $881, or $855 with allowance for unemployment.[15]

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[12] Ibid., p. 16. Since in the Louisville study the income distributions are given only by age and not by sex, it was impossible to correct for this factor.

[13] U.S. Department of Commerce. *Business Statistics* (1959 ed.), Supplement to Survey of Current Business, p. 71.

THE HARRISON COUNTY STUDY

The Harrison County (W. Va.) study deals with a recent year, 1956, which is also the last year covered in Schultz' paper. It treats as separate groups the dropouts and the high-school graduates and thereby allows us to get a picture of the relative earnings of the graduates and of the dropouts. In this and other respects, it supplements the Louisville study well.

Harrison County is an area with a high incidence of unemployment. The study in that county includes all who graduated from high school between 1952 and 1955, but did not go on to college, and also those who were enrolled in the 8th to the 12th grades between 1951 and 1955 and dropped out before graduating.[16]

The population of Harrison County is 98 percent white and 97 percent native born. At the time of the study it was subject to little immigration, but heavy outmigration. One-half of the original study sample had left the county by the middle of 1956, and over 60 percent of the outmigrants were boys. For the great majority of boys, outmigration represented entering military service. By the summer of

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[14] Income forgone per student was also computed, using the median weekly incomes given in the Louisville study, op. cit. (p. 46). Income forgone, computed using the median, was 2.86 percent less than income forgone computed by the mean.

In 1955-56 the annual pay of an unmarried private in the U.S. Army came to $980. According to information obtained from the Department of Defense, the cost of food came to $400 ($1.10 per day) and of clothing [illegible]. Thus the total income of a private—in cash and in kind—came to $1,5[illegible]. This figure falls short of any allowance for quarters, medical care and retirement benefits. Under conditions of a draft one would expect that the military pay should be below the market price.

[15] Some calculations that I made, which cannot be presented here in detail, lead me to the conclusion that the cost of subsistence for a single individual at this time was approximately between $1,400 and $1,500, depending on the age of the individual and the location. It can thus be seen that the figure used for the potential full-time income of the average high school student, namely, $1,917.60, is well above the subsistence level. On the other hand, Schultz' corresponding full-employment income figure would come to only $1,122. In the face of a great deal of historical evidence pointing in the opposite direction, it does not seem plausible that the average high school student in the United States in 1956 would fall short by such a substantial margin from earning his subsistence.

[16] There were 3,305 students in these categories: 2,106 were high-school graduates and 1,199 were dropouts. The sample—940 boys and girls—was made up of 25 percent of the graduates and of 33 percent of the dropouts.

1956, 44 percent of the males of the original sample were in military service, as compared with a national figure of 29 percent for 17- to 21-year-old males.

The proportion of high school graduates going on to college from Harrison County, and its secondary school retention rate, are very close to the national averages. Of the total group of 3,305, mentioned previously, 1,741 were girls and 1,564 were boys. However, because of a high marriage rate and consequent nonparticipation in the labor force, the proportion of girls in the labor force was much smaller. Because of a requirement of work permits for dropouts under 16, only 9 percent of the total dropouts were less than 16 years of age at the time of leaving school. One-third of the dropouts left school as soon as they reached 16. However, another third—mostly repeaters—were 18 or older at the time they dropped out. Of the graduates, none was younger than 17, almost two-thirds were 18, and 26 percent were 19 or older.

The dropouts had lower scholastic achievement and lower IQ scores than the graduates. Many of the dropouts were repeaters, and more than one-third of them, compared to 14 percent of the graduates, had IQ's of less than 85. The dropouts had taken fewer vocational courses, and in this respect were less prepared.[17]

Because Harrison County was in a state of severe depression in 1956, the earnings of these groups were probably markedly lower than those we might obtain from a nationwide sample.[18] By the method described previously, I again calculated means from the given frequency distribution. The values of the medians and means are as follows:

Item	Boys		Girls	
	Graduates	Dropouts	Graduates	Dropouts
Median[1]	$65.00	$52.00	$44.00	$26.00
Mean	75.50	56.42	44.60	32.44

[1] Source: Riches, op. cit., p. 1462.

Therefore, the mean weekly wage for all the graduates would come to $60.05 and the comparable wage for the dropouts would come to $44.43. The corresponding annual full employment incomes for 51 weeks would be $3,063 and $2,266. It will be remembered that from the data reported from the Louisville study, I calculated a potential annual income for high-school students in 1956 of $1,918.

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[17] Riches, op. cit., p. 1459-1460.

[18] In the summer of 1956, 13 percent of the school leavers—both graduates and dropouts—were unemployed (ibid., p. 1463), a proportion much above the national average.

It appears, however—to the extent that this can be determined—that the dropouts in the Harrison County study, *at the time they earned the annual income of $2,266*, represented a group whose weighted average age was about 3 years above that of the total high-school population of the United States.

The Harrison County study gives the age distribution at the time of leaving school for all school leavers, boys and girls, both graduates and dropouts, for the years 1951–55.[19] From this I calculated a weighted average age at the time of leaving school, of 18.21 years for the graduates and 16.88 years for the dropouts. I assume that each year's group of graduates and dropouts between 1952 and 1955 had an age distribution closely similar to that of the aggregate group for 1952–55. On the basis of this assumption, which seems reasonable, I use the resulting weighted averages to obtain an average age for these groups as of July 1956, the date of the income figures cited previously.

In July 1956 the average age of all who graduated between 1952 and 1955 could be determined as follows:

Graduating class	*Age as of July 1956*
1955	18.21+1=19.21
1954	18.21+2=20.21
1953	18.21+3=21.21
1952	18.21+4=22.21

The average age of the graduates in July 1956 was 20.71 years, and of the dropouts 19.38 years. During the period of heavy outmigration from the county, the outmigrants probably consisted mainly of older youths who had found the job market at home unsatisfactory. To make allowance for this, the average age of both the graduates and the dropouts who were in the labor market in the county in 1956 was reduced by 1 year—to 19.71 and 18.38 years, respectively. We observe that while the high-school graduates are approximately 1 year and 4 months older than the dropouts, their income exceeds that of the dropouts by about 35.2 percent.

It does not appear possible to correct quantitatively for difference in intelligence among the groups studied and to make calculations of the income forgone by high-school students more representative of the actual capacities of the entire high-school population. The excess of income of high-school graduates over that of the dropouts found in the Harrison County study results from superiority in both intelligence and education, but it is not easy to determine how much should be allocated to one and how much to the other of these two factors. The boys and girls in the Harrison County study are too old to provide a suitable basis for an estimate of income forgone by high-school students, and at the same time, since no members of this group intended to go to college, the earnings of this group would not be suitable as a basis for calculating the income forgone by college students. The findings of the Harrison County study, however, support the data of the Louisville study and the Indiana study, both of which are small-sample studies. The Harrison County study thus helps to round out the broader picture of the wage structure of adolescents and increases our confidence in the findings of the other studies used here.

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[19] Riches, op. cit., p. 1458.

THE INDIANA STUDY AND INCOME FORGONE BY COLLEGE STUDENTS

On the basis of data from two sources, I have arrived at a figure for the income forgone in 1956 by students while they were attending colleges and universities. For ages 14–24 these data were obtained from a study of high-school graduates in Indiana who did not continue their education beyond the high-school level. This study was focused on the upper 10 percent (in rank in their graduating class) of the 31,313 boys and girls who graduated from Indiana high schools in the spring of 1955. Of this group, considered to represent potential college material, 808, or 27 percent, did not go on to college. At the time of the study the median age of these high-school graduates was about 19 years. This compares with a weighted average of 20.4 for those between 14 and 24 who were enrolled in colleges or universities in 1956.[70] The mean weekly income of the boys was $49.21 and that of the girls $55.83.[71] These weekly income data were weighted for the proportion of boys and girls aged 14–24 in the college population, and the two figures were averaged, giving a figure of $51.75 as the income forgone by college students during 1 week. During the school year of approximately 40 weeks, they would forgo $2,070 in income. These data, together with other calculations, are presented in the table that concludes this section. It is important to point out that this figure of $2,070 represents the 40-week income of a group that are directly comparable to college students in age, in education (in that they have at least graduated from high school), and in intellectual capacity.

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[70] *Statistical Abstract of the United States, 1956*, table 126.

[71] The mean income of the graduates was $54.9 per week. At this rate they would have earned a mean income of $2,810 for a full year's work (51 weeks). This is close to the mean income of high-school graduates in the Harrison County study, which was $3,063. The median age of the two groups of graduates is very similar, 19.78 in Harrison County as compared with 19 in Indiana. In respect to other important characteristics these groups were significantly different: the Indiana study represents a very select group of high-school graduates—the upper 10 percent of the graduating class—and the Harrison County study does not. The Harrison County study represents an area of high unemployment, at the time of the study, and the Indiana study does not.

The phenomenon of the girls earning more than boys in the case of the Indiana sample seems to be explained by the fact—brought out in other parts of the study—that a larger proportion of the boys than the girls who were in the upper 10 percent of their class and did not go on to college were social deviates.

The calculations of income forgone by students aged 25–29 are based on data from the 1950 U.S. Census of Population special report on education.[22] Although the income figures given in this report for the younger age groups included so many casual and part-time workers that the data do not appear useful for my purposes, the bias appears to be much less in the 25–29 age group. After age 25 there is a sharp drop in the percentage of employed males who work less than 40 weeks of the year.[23] A similar drop occurs among females after age 20.

The first step in arriving at a figure for income forgone by college students in the 25–29 age group was to average, separately for males and females, the 1949 incomes of persons aged 25–29 who had completed 1–3 years of college and those with 4 or more.[24]

The 1949 figure was adjusted for the increase in wages between 1949 and 1956 by applying the percentage increase in wages in manufacturing between these years to my data.[25] For 1956 I obtained a mean income of $4,435 for males aged 25–29 with the specified education and $2,743 for females.

In order to arrive at a figure for income forgone, it was necessary to know the weekly income that these total figures represented. The census report on employment and personal characteristics[26] gives the percentage of those employed in 1949 who worked 1–13 weeks, 14–26, 27–39, 40–49, and 50–52 weeks. The midpoints of 7, 20, 33, 45, and 51 weeks were used, following Schultz' method in calculating the average number of weeks worked. For males the figure was 45 weeks and for females 36 weeks; this gives a weekly income for males of $98.57 and for females of $76.19. As was done with the Indiana data, these weekly income figures were weighted for the proportion of males and females aged 25–29 in the college population, and then averaged, giving a figure of $97.84 as the income forgone by the students during 1 week. During a 40-week school year, $3,914 of potential income would have been forgone by these college students.[27]

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[22] U.S. Department of Commerce, Bureau of the Census. *U.S. Census of Population, 1950*, vol. 4. *Special Reports*, part 5, ch. B. Education. Washington, D.C., 1953, table 12, p. 109.

[23] Ibid., part 1, ch. A. "Employment and Personal Characteristics," table 14.

[24] I assumed that at least half of this group consists of graduate students and that no one in this group is a freshman. For supporting evidence see *Biennial Survey of Education, 1954–56*, ch. 4, table 22, p. 49. In his calculations of the income forgone by college students, Schultz uses the median income for each age group as given in the census report on education, weighted for the proportion of that age group in the college population, without regard to years of school completed. An estimate of income forgone by college students should, however, take into consideration the fact that they have all completed 4 years of high school and could earn an income at least equivalent to that of a high-school graduate.

[25] The percentage increase was calculated from data given in U.S. Department of Commerce, Office of Business Economics, *Business Statistics*, 1959 ed., a supplement to the *Survey of Current Business*, Washington, D.C., 1959, p. 71.

[26] U.S. Bureau of the Census, *U.S. Census of Population, 1950*, vol. 4, *Special Reports*, part 1, ch. A, Employment and Personal Characteristics, Washington, D.C., 1953, table 14.

To calculate income forgone by all the college students, the figure for each age group was weighted according to the proportion of that age group in the total college student population, the final figure was $2,350.[28]

Income forgone by college students, 1956

Age	*40 weeks*	*51 weeks*
14–24 [1]	$2,070	$2,639
25–29	3,914	4,990
Weighted overall average	2,350	2,997

[1] I have used the data from the Indiana study relating to a group whose median age is comparable to that of college students aged 14–24, to represent the income forgone by these students. The figure is not, of course, an actual weighted average of the income of persons 14–24 years old.

III. Concluding Observations

Thus, on the basis of the data previously discussed, my estimate of the income forgone by high school students in the United States under the assumption of full employment would come to $11,581 million, as compared to Schultz' figure of $6,784 million. For college students the estimates would be $7,041 million and $6,009 million, respectively.[29]

Schultz' calculations have the advantage of being based on the large and representative samples used in the collection of census data. But since the categories were intended for other uses than those to which he put them, it is necessary for Schultz to subject the census figures to considerable statistical manipulation and to make a number of assumptions concerning them, thus introducing a substantial downward bias.

The main weakness of my figures is that they are based on sample data for special regions of the Nation and a question may be raised about their representativeness for the Nation as a whole. The figures obtained from the five separate studies seem to dovetail closely. Fortuitous circumstances may have caused this consistency, but I hope it is rather due to the fact that the study areas were well chosen and are in their basic characteristics representative of the universe.[10]

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[27] Insofar as it applies to graduate students, this figure is undoubtedly exaggerated, since some graduate students hold research and teaching jobs. Graduate students, however, amount to less than 10 percent of the college population. If we assume that one-quarter of the graduate students, excluding law and medical students, hold such jobs, the overstatement would affect less than 2.5 percent of the total college-student population.

[28] Since the proportion of the college-age group attending college is approximately one-half of the proportion of the high school age group attending high school, it is probable that the estimate of the income forgone by the college population is significantly more accurate than the estimate of the income forgone by the high school population. The inability to allow for the falling marginal product is a less serious shortcoming in the case of the college population than it is of the high school population. This means that a more accurate calculation than can be produced here would probably show a greater differential between the earnings forgone by high school students and by college students than is indicated by my figures.

[29] In his paper Schultz assumes an incidence of 3 percent unemployment. Such an allowance, of course, would not change the relative difference between our respective estimates.

The figures presented here based on the five empirical studies exceed Schultz' estimate. The figures for income forgone per high-school students in 1956 are 71 percent above his estimate; for college students the difference is only 17 percent. However, more recent data on part-time employment of students have been called to my attention by Schultz and these new data suggest revisions in the estimates of earnings forgone, which reduce the difference in estimates to 67.5 percent for earnings of high school students and 12.5 percent for earnings of college students.[11]

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[10] EDITOR'S NOTE:

Professor Schultz in commenting on the study noted: "It is exceedingly difficult to go from a few studies of small communities to the United States as a whole. Moreover, in developing estimates of earnings forgone by students, effects of agricultural earnings and of the amounts students receive from jobs while they are in school should not be excluded."

[11] These estimates need to be corrected to reflect additional information on earnings of students in part-time employment both during the school year and during summer vacations. Arnold Katz in a Special Labor Force Report on "The Employment of Students" (U.S. Bureau of Labor Statistics Report No. 6, October 1959), indicated that 22.6 percent of the students 14 to 17 years of age worked for 11.4 hours per week, and 39.8 percent of the students 18 to 24 years of age worked 25.7 hours per week, on the average. In view of the fact that October is not a typical month in a student's work and study pattern and also the prior allowance for part-time employment, the maximum correction called for appears to be about half that indicated by the October estimates, or 3.2 percent in earnings per high-school student and 12.8 percent per college and university student. (The full allowance for the overestimate, assuming October were representative of the whole school year, may be calculated as follows: If 22.6 of every 100 students 14-17 years old work 11.4 hours per week, they earn wages for 257.64 hours; since it is assumed that they forgo weekly earnings for 40 hours each, or 4,000 hours in the aggregate for each 100 students, the number of hours not worked must be reduced 6.44 percent. The same calculation for the students of college age (18-24 years of age) suggests a correction of 25.6 percent.)

Accordingly, reducing the average earnings forgone by high school and college or university students by 3.2 percent and 12.8 percent, respectively, the resultant figures are $1,456 for 1955-56 and $1,519 for 1957-58 as the earnings forgone per high school student, and $2,019 for 1955-56 and $2,139 for 1957-58 per college or university student.

APPENDIX C

Qualification on Estimates of State Tax Moneys

Selma J. Mushkin

DESPITE THE IMPORTANCE of State governments in supporting student higher education, the facts about this support are far from precise. At times, in fact, information used to record the amount and importance of State financing obscures rather than clarifies the issues. For example, Bureau of the Census data on expenditures of institutions of higher education are used to represent the amounts of State tax funds. These expenditures, however, are financed partly by tuition fees, partly by gifts and grants, and partly by tax funds.

Even data on State and local funds received by colleges and universities as tabulated by the U.S. Office of Education are not adequate to represent State tax funds for student higher education. State and local governments finance a number of activities beyond those included in student higher education. These activities range from materials testing centers used by industry to public concerts and art exhibits. State universities and colleges are used as a base for research on public issues by both legislative and executive agencies and as experimental laboratories for types of farming and industrial operations. They help to carry out programs of rehabilitation, medical assistance, and child health. They have been an important administrative arm of both State and National agencies in agricultural programs. All these and many other similar activities are additional to both teaching and research.

The part of any source of income, such as State and local appropriations, that may be allocated to one rather than another activity of colleges and universities cannot be exactly determined. There are some guides and some information on sources specifically related to a function, for example on gifts set aside for research, or on receipts from products and services, such as sales of creamery products or fees received by a dental school clinic. But necessarily a large element of approximation is involved in attempting to estimate the sources of income used to finance a single function in a multifunction enterprise. A beginning toward identifying State and local funds for student higher education was made by the National Planning Association study in which information tabulated by the U.S. Office of Education on "current income for educational and general purposes" was used as a base. This figure excludes receipts from operating auxiliary enterprises and amounts received for scholarships and other student aids. Amounts specifically designated for research were excluded from each of the sources of income reported for educational and general purposes. Furthermore, only that part of income from "organized activities related to educational departments" and from "sales and services" of these departments that was in excess of expenditures for these same purposes was included. In addition to funds set aside for research customarily reported to the U.S. Office of Education, research funds from State and local governments and Federal funds for agricultural experiment stations were excluded also.

Additional work is needed in order to provide information on State and local government tax moneys for each of the functions of the institutions of higher education—student education, research, and public services. The data presented in chapter 11 are a beginning toward the development of such estimates. In that chapter a method was developed that offers some promise toward the separation of student higher education from other functional expenditures. The method, in brief, requires the determination of the total expenditures for student higher education and a balancing of receipts to match the aggregate expenditure by identifying receipt items appropriated with purposes clearly other than student higher education; for example, research. The remaining revenue items are then prorated to balance the expenditure total. One exception is made to this proration, namely, tuition, because tuition paid by the students is intended by the students to be used exclusively for their education.

Table 1 shows local funds for higher education and the percent that these funds are of total State and local current funds, for the various States, for the regions, and for the Nation as a whole.

TABLE 1.—Local funds for higher education (current funds only): amount and as a percentage of total State and local current funds,[1] 50 States and District of Columbia, 1957–58

[Amounts in millions]

State and region	Total, State and local [2]	Local	
		Amount	Percent of total
Total 50 States and District of Columbia	**$1,267.9**	**$131.8**	**10.4**
NEW ENGLAND	37.1	0.9	2.4
Maine	3.6	.1	1.7
New Hampshire	3.7	.1	3.8
Vermont	3.3	.1	3.6
Massachusetts	11.4	.3	2.6
Rhode Island	3.6	----------	0
Connecticut	11.5	.3	2.3

See footnotes at end of table.

TABLE 1.—Local funds for higher education (current funds only): amount and as a percentage of total State and local current funds,[1] 50 States and District of Columbia, 1957–58—Continued

[Amounts in millions]

State and region	Total State and local [2]	Local	
		Amount	Percent of total
MIDEAST	$166.7	$31.4	$18.8
New York	87.1	28.1	32.3
New Jersey	17.5	.6	3.5
Pennsylvania	36.6	.2	.4
Delaware	3.2	----------	0
Maryland	20.5	.7	3.6
District of Columbia	1.8	1.8	100.0
GREAT LAKES	277.6	15.9	5.7
Michigan	90.7	6.4	7.0
Ohio	40.9	5.7	13.8
Indiana	38.5	.6	1.6
Illinois	78.0	2.6	3.3
Wisconsin	29.5	.6	2.1
PLAINS	137.2	7.6	5.5
Minnesota	33.5	.8	2.5
Iowa	28.6	.3	1.2
Missouri	21.5	1.4	6.4
North Dakota	8.7	.1	1.7
South Dakota	7.2	(3)	.1
Nebraska	14.7	1.4	9.3
Kansas	23.0	3.6	15.5
SOUTHEAST	219.6	7.9	3.6
Virginia	21.4	(3)	.1
West Virginia	15.9	(3)	0
Kentucky	12.0	1.3	11.0
Tennessee	15.5	.4	2.6
North Carolina	22.7	.3	1.4
South Carolina	12.3	.2	1.6
Georgia	17.9	1.6	8.7
Florida	27.1	.5	1.9
Alabama	16.0	.6	3.6
Mississippi	12.4	2.7	21.7
Louisiana	33.5	.3	.8
Arkansas	12.9	(3)	0
SOUTHWEST	109.5	8.7	7.9
Oklahoma	21.2	.1	.4
Texas	68.4	7.3	10.7
New Mexico	9.0	.5	5.5
Arizona	10.9	.8	7.0
ROCKY MOUNTAIN	50.1	2.8	5.6
Montana	11.9	.1	1.1
Idaho	6.6	.7	10.4
Wyoming	4.8	.4	9.2
Colorado	16.7	1.5	9.0
Utah	10.1	.1	1.1
FAR WEST	270.5	56.7	21.0
Washington	35.2	1.2	3.3
Oregon	22.0	.5	2.2
Nevada	2.6	----------	0
California	205.4	54.9	26.7
Alaska	1.7	.1	3.8
Hawaii	3.6	----------	0

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[1] Includes State and local funds (other than research) reported as current income by colleges and universities and also State scholarship and expenditures and other expenses of State higher education agencies.

[2] Totals may not add due to rounding.

[3] Less than $50,000.

SOURCE: Computed from U.S. Department of Health, Education, and Welfare, Office of Education, unpublished preliminary data compiled for "Statistics of Higher Education," Biennial Survey of Education in the United States, 1956–58, ch. 4, sec. II, tables 1 and 3, and from unpublished data compiled from State fiscal offices by the U.S. Department of Commerce, Bureau of the Census, for *Compendium of State Government Finances in 1958.*

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